

SWIFT FOX INVESTIGATIONS IN NEBRASKA, 1995

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ABSTRACT

No swift fox field investigations were conducted in Nebraska in 1995. An application for research funding to conduct DNA investigations of swift fox populations at a Nebraska Game and Parks Commission laboratory was submitted to the U.S. Fish and Wildlife Service (see Appendix 1) but funding was denied. One active swift fox natal den was confirmed in Sioux County in 1995. The species is known to occur in very limited numbers in the panhandle and southwest Nebraska.

INTRODUCTION

The swift fox was thought to be relatively common in the central and western parts of Nebraska before the state was settled but disappeared between about 1900 and the early 1950's (Jones 1964). The species was listed as endangered in Nebraska in 1972 and has remained protected by that listing since (Appendix 2). An ecological study of swift fox was conducted from 1978 through 1980 (Hines 1980). Since then, a number of investigations have been conducted to determine the distribution and status of the species in the state. These have included aerial searches for swift fox dens, spotlight surveys, the distribution of questionnaires to landowners and solicitation of sighting reports. In addition, news releases have been prepared to encourage hunters to be sure of their targets when hunting coyotes, and signs have been installed along one particular stretch of highway, encouraging motorists to avoid collisions with swift fox. An informational brochure pertaining to swift fox in Nebraska was also prepared to increase public awareness of swift fox.

STUDY AREA AND METHODS

Because no swift fox field investigations were conducted in Nebraska in 1995, the study area and methods are not applicable. Information on earlier survey techniques can be obtained from the Nebraska Game and Parks Commission.

RESULTS

The ecological study of swift fox in Nebraska from 1978-80 yielded considerable valuable information on home range, movements, habitat use, food habits, mortality factors and other aspects of the species. Several mortality factors affecting swift fox have been identified in Nebraska and in other plains states. Cause of death was determined for 7 of 11 swift fox found dead during an ecological study conducted in Nebraska from 1978-80 (Hines 1980). Four were determined to be killed by vehicles and 3 were shot even though the species was fully protected at the time. No coyote or red fox predation on swift fox was identified, although both species do occur in the study area.

Aerial den searches were not found to be of value primarily because of the difficulty of differentiating swift fox digging activity from that of badgers, coyotes and other species from an aircraft.

Although we were able to locate swift fox using spotlights, the numbers observed were too low to provide any indications of population size or trends.

The value of warning signs along roadways is largely unknown. Initially, problems were encountered with theft of the signs and vandalism, but those problems later subsided. We have received sighting reports from the public in response to the signs.

Questionnaires sent to landowners and follow-up contacts with cooperative landowners have been quite valuable in assessing swift fox status in a particular area. The distribution of posters and news releases that provide information on the plight of swift fox and encourage individuals to report sightings have also been found to be quite valuable.

Only one swift fox sighting was confirmed in Nebraska in 1995, an active natal den found in June in Sioux County.

Funding for swift fox work in Nebraska has primarily been from general fund appropriations for nongame wildlife, a state income tax check-off for nongame and endangered species, and federal Section 6 funds.

DISCUSSION

Attempts to determine distribution and status of the swift fox population in Nebraska in recent years have been only marginally successful. Swift fox numbers appear to be very low, making it difficult to estimate population size or trends.

Reliable survey techniques to assess status and distribution of swift fox are needed. Several different survey techniques have been used in a number of states with mixed results. The development of standardized techniques that could be used throughout the swift fox range would be very helpful in assessing swift fox populations. The application of such standardized surveys by one survey team in a number of adjacent states could improve the efficiency of swift fox surveys.

Although some swift fox mortality factors have been identified in Nebraska, the impact of these factors on the overall population is largely unknown. We have some indication that coyote and red fox numbers have increased in some areas occupied by swift fox in Nebraska in about the last 20 years (R. Lock, Nebr. Game and Parks Comm., personal communication). Large proportions of mortality on swift fox in Kansas (Lloyd Fox 1994 Midwest Furbearer Conference) and kit fox in California (Ralls and White 1995) have been attributed to predation by larger canids. Future swift fox research should focus on mortality factors, especially to identify predation by other canids and the potential impact predation and other mortality factors have on swift fox populations.

Costs for swift fox activities in Nebraska have not been prohibitive in the past. Time constraints for permanent employees and the lack of funds for temporary employees have limited swift fox work in Nebraska in recent years.

LITERATURE CITED

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APPENDIX 1

U.S. FISH & WILDLIFE SERVICE, DEPARTMENT OF INTERIOR

APPLICATION FOR RESEARCH FUNDING

Title of Proposed Project

Characterization of Swift Fox Metapopulation using Sequence Analysis of the Hypervariable Region of Mitochondrial DNA.

Total Amount Needed \$105,300

Amount Requested \$96,525

First Year \$26,325 Second Year \$35,100 Third Year \$35,100

Proposed Duration of Research

From June 1, 1995

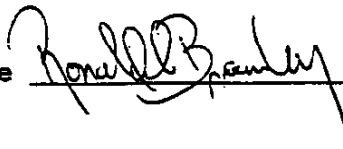
To May 31, 1998

Project Abstract The swift fox (*Vulpes velox*) is a small carnivore that inhabits arid regions of western and south-central United States. Swift fox populations are fragmented and reduced in numbers from their historical range. Unlike kit fox (*V. macrotis*), there is limited information regarding swift fox subspeciation. Presently, it is unclear whether there are two subspecies of swift fox, the northern (*V.v.hebes*) and the southern (*V.v.velox*). Previous work failed to resolve the swift fox subspeciation issue. We propose to genetically characterize swift fox metapopulations using PCR-based amplification and sequencing protocols to analyze the highly polymorphic 200 base pair region of the hypervariable region (known as the D-loop) found in mtDNA. Our findings will clearly determine whether subspecies designation is warranted for the swift fox, thus providing regulatory and management options currently not available.

Location of Research Facilities

Nebraska Game and Parks Commission
Genetic & Forensic Analysis Laboratory
2200 N. 33rd St.
Lincoln NE 68503

Principal Investigator Signature



Date January 9, 1995

Characterization of Swift Fox Metapopulation using Sequence Analysis of the Hypervariable Region of Mitochondrial DNA.

Introduction

Background The swift fox (*Vulpes velox*) is a small carnivore that inhabits arid regions of western and south-central United States (FaunaWest Wildlife Consultants, 1991, Mercure et al., 1993). "Currently, swift fox exist in highly disjunct populations in a greatly reduced portion of the species historical range (Eklund, 1994)". Though several subspecies of kit fox (*Vulpes macrotis*), a close relative of swift fox, has been defined; there is limited information and controversy concerning whether swift fox subspecies exist (Eklund, 1994). Presently, the question exists whether there are two subspecies of swift fox, the northern subspecies (*Vulpes velox hebes*) and the southern subspecies (*Vulpes velox velox*). It is also unclear as to the distribution of these potential subspecies. On February 22, 1992, a petition was received by the Fish and Wildlife Service requesting that the swift fox (*Vulpes velox*) be listed (at minimum) as an endangered species in at least the northern portion of its range. Previous work by Mercure et al., 1993 demonstrated a genetic distinctness between kit fox and swift fox. However, due to what appears to be limited sampling locations of swift fox, this study was unable to demonstrate any subspecies of swift fox (eg., *Vulpes velox velox* vs. *Vulpes velox hebes*).

Statement of Problem Since "limited information concerning swift fox subspecies designation exists, the Service is unable to address the appropriateness of subspecific designations for the purpose of (Eklund, 1994)" making a decision whether to add this species to the List of Threatened and Endangered Wildlife and Plants. Recent advances in the knowledge and techniques of molecular systematics allows for the expansion of information necessary for the decision on the status of swift fox. First, polymerase chain reaction (PCR) techniques allow for selective amplification of a short segment of mtDNA. In this study, the segment of DNA to be amplified and sequenced is the hypervariable region known as the D-loop. The non-coding D-loop is not under selective control and therefore may evolve faster than the cytochrome b gene (Brown, 1983, Whitmore et al., 1992). The hypervariable D-loop may be "optimal for intraspecific analyses" whereas protein coding gene sequences "may be better suited for analyses of systematic relationships" (Whitmore et al., 1992). In otherwords, by analyzing a segment of DNA not under selective control, greater intraspecies differentiation is possible. Second, a much higher resolution of genetic differences is possible by sequencing the 200 base pair D-loop and examining nucleotide variations instead of cutting the amplified DNA strands with restriction enzymes and analyzing the fragments for variations or polymorphisms (the technique known as PCR amplified restriction fragment length polymorphism or PCR amplified RFLP).

Project Objectives We propose to genetically characterize swift fox populations using PCR-based amplification and sequencing protocols to analyze the highly polymorphic 200 base pair region of the hypervariable region (or D-loop) found in mtDNA. We have 3 (three) objectives for this project.

- 1) Collect swift fox tissue, blood, hair or whole teeth samples throughout it's present range which includes the following states: Nebraska, South Dakota, Wyoming, Colorado, Kansas, Oklahoma, Montana, New Mexico and Texas along with the introduced population in Canada. Collect a representative sample of kit fox (*Vulpes macrotis*) in and outside of the hybrid zone areas of Texas and New Mexico.
- 2) From nucleotide sequence variations, determine genetic divergence utilizing the aforementioned samples.
- 3) Develop a phylogenetic reconstruction of the swift fox populations which will determine the level of genetic divergence in swift fox.

Scientific Justification There are several reasons to undertake the phylogenetic analysis of swift fox. First, in the ninety-day petition finding for the swift fox (Eklund, 1994), the Service has decided that since "limited information concerning swift fox subspecies designation exists, the Service in unable to address the appropriateness of subspecific designations" and "will continue to review and consider the appropriateness of the subspecific designations for the swift fox as new information becomes available" (Eklund, 1994). Phylogenetic analysis will be instrumental in the decision of whether one, or more, subspecies of swift fox exist. Secondly, in the study cited by the Service, only a limited sampling (other than Colorado and Wyoming) was utilized to try to differentiate subspecies, sampling throughout the present range will allow for a greater opportunity to conclude if subspecies of swift fox exists. If swift fox subspecies exist, this study will help delineate their distribution. Should a northern and southern subspecies be differentiated, listing would provide the protection and management under the Endangered Species Act for this population. By utilizing PCR techniques and amplifying only a 200bp fragment (as opposed to a larger 612 bp cytochrome b fragment), samples that normally would be considered too degraded to extract amplifiable DNA (such as museum specimens), will be able to be included in this study (Pääbo, 1986, Pääbo et al., 1989, Goelz et al, 1985).

Research Strategy

Sampling Tissue, whole blood or blood stains, hair (with follicles) and/or whole tooth samples will collected from the aforementioned states during year 1 and 2 of the study. Samples will be placed on dry ice if possible and shipped by overnight mail, or preserved in a DMSO-salt solution (20% DMSO, 250 mM

EDTA, saturated NaCl, pH 7.8) which will allow for the shipment of the sample without cryopreservation (Proebstel et al., 1993). Whole blood samples will be placed in EDTA vacutainer tubes and shipped overnight on wet ice. Samples will be obtained through the State Wildlife agencies, trappers, museums and stored samples utilized for previous studies.

DNA extractions DNA will be extracted from the tissue samples by classical phenol-chloroform, proteinase K extraction techniques (Maniatis et al, 1989, Davis et al., 1980). DNA from tooth roots, whole blood or blood stains will be extracted by a Chelex (BioRad Laboratories, California) extraction method protocol utilized by the National Fish and Wildlife Forensic Laboratory, Ashland Oregon (LeMay, 1994). DNA will be extracted from hair samples utilizing the protocol by Higuchi et al., 1988. Museum specimen DNA extraction will be performed utilizing methods developed by Pääbo 1986, Pääbo et al., 1989 and Goelz, et al., 1985.

DNA amplification, sequencing and analysis All samples will be amplified by the polymerase chain reaction (Mullis et al., 1986) utilizing primers developed and synthesized by the National Fish and Wildlife Forensic Laboratory, Ashland Oregon (LeMay, 1995). This primer set has successfully been used in phylogenetic analysis of kit fox (*Vulpes macrotis*) and other canids (LeMay, 1995). DNA sequencing will be accomplished by the chain termination method developed by Sanger et al., 1977. DNA sequences will be analyzed using the DNASTAR Seq*Easy Digitizer (Madison WI) located at the Nebraska Game and Parks Commission, Lincoln, NE (DNASTar, 1992). Phylogenetic relationships will be ascertained by utilizing a number of mathematical computer models (Nei et al., 1981, Nei et al., 1985, Felsenstein, 1985, Swofford, 1989, Felsenstein, 1989).

Anticipated Results Our findings will clearly determine whether subspecies designation is warranted for the swift fox, thus providing regulatory and management options currently not available.

Research Budget and Proposed Funding Sources

YEAR 1

PRIMARY INVESTIGATOR SALARY (HALF-TIME) 12 MO. X \$1,000/MO.	\$12,000
LAB ASSISTANT (1/4 TIME) 12 MO. X 7.50/HR	\$ 3,600
REAGENTS, SEQUENCING AND PCR ENZYMES, CHEMICALS	\$ 7,500
PCR AND SEQUENCING PRIMERS	\$ 1,000
SAMPLING SUPPLIES	\$ 4,000
MISC. SUPPLIES AND EQUIPMENT	\$ 4,500
<u>TRAVEL</u>	<u>\$ 2,500</u>
TOTAL NEED	\$35,100
TOTAL REQUESTED	\$26,325

RESEARCH BUDGET AND PROPOSED FUNDING SOURCES CONT.

YEAR 2

PRIMARY INVESTIGATOR SALARY (HALF-TIME) 12 MO. X \$1,000/MO.	\$12,000
LAB ASSISTANT (1/4 TIME) 12 MO. X 7.50/HR	\$ 3,600
REAGENTS, SEQUENCING AND PCR ENZYMES, CHEMICALS	\$ 7,500
PCR AND SEQUENCING PRIMERS	\$ 1,000
SAMPLING SUPPLIES	\$ 4,000
MISC. SUPPLIES AND EQUIPMENT	\$ 4,500
<u>TRAVEL</u>	<u>\$ 2,500</u>
TOTAL NEED AND TOTAL REQUESTED	\$35,100

YEAR 3

PRIMARY INVESTIGATOR SALARY (HALF-TIME) 12 MO. X \$1,000/MO	\$12,000
LAB ASSISTANT (1/2 TIME) 12 MO. X 7.50/HR	\$ 7,200
REAGENTS, SEQUENCING AND PCR ENZYMES, CHEMICALS	\$ 6,000
PCR AND SEQUENCING PRIMERS	\$ 1,000
MISC. SUPPLIES AND EQUIPMENT	\$ 5,900
<u>CONFERENCE TRAVEL AND PUBLICATION COSTS</u>	<u>\$ 3,000</u>
TOTAL NEED AND TOTAL REQUESTED	\$35,100

All states involved will be solicited for matching funds.

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◆ 1995 ◆ ◆ NEBRASKA ◆

Hunting Guide Seasons and Regulations



1995-96 PERMITS AND STAMPS		
	1995	1996
Resident Combination Hunt-Fish Permit	\$19.50	\$21.75
Resident Annual Small Game Hunting Permit	8.50	9.50
Nonresident Annual Small Game Hunting Permit	40.00	35.00
Resident Deer Permit	20.00	22.50
Nonresident Deer Permit	100.00	160.00
Resident Antelope Permit	20.00	22.50
Nonresident Antelope Permit	100.00	12.00
Resident Wild Turkey Permit	15.00	16.75
Nonresident Wild Turkey Permit	50.00	56.00
Habitat Stamp	10.00	10.00
Resident Fur Harvest	15.00	18.75
Nonresident Fur Harvest (reciprocal)	200.00	224.00
(1,000 or less fur-bearing animals; plus \$10 for each additional 100 or part of 100)		
(plus issuance fee for permits)		



Nebraska Game and Parks Commission
2200 N. 33rd St. / P.O. Box 30370
Lincoln, NE 68503 (402) 471-0641

APPENDIX 2

ATTENTION ALL HUNTERS

During the firearm deer season, wild animals other than deer may be hunted only with a shotgun or 22 rimfire rifle or 22 rimfire handgun, except that this does not apply to the statewide muzzleloader season or a bona fide farmer or rancher or a member of his immediate family while hunting on land owned or leased by the farmer or rancher. Deer hunters with valid (unfilled) firearm permits may also hunt other animals with a centerfire rifle or centerfire handgun during the firearm deer season.

IT IS UNLAWFUL TO...

- Interfere with a person lawfully engaged in hunting, trapping or fishing.
- Hunt on private land without permission of the owner or his agent.
- Use a hunting permit unless it is signed by the holder.
- Lend or transfer a permit to another person.
- Borrow a hunting permit from another person.
- Procure a permit under an assumed name.
- Falsely state the place of legal residence.
- Hunt or secure a permit if disqualified from holding a permit.
- Refuse to show the hunting permit on demand to any person or officer whose duty it is to enforce the game laws and regulations.
- Take a legal limit of any species and return to take more of the same species in the same day.
- Give, put or leave any game birds or game animals at any place or in the custody of another person unless the birds or game animals are tagged by the hunter with the following information: (1) hunter's signature, (2) hunter's address, (3) total number of animals involved, by species; (4) date such animals were killed.
- Hunt, kill, take, trap, or attempt to hunt, kill, take, or trap any game birds from a vehicle of any kind.
- Possess any species taken on a small game permit longer than August 1 following the close of the season.
- Shoot from any public highway, road or bridge.
- Have or carry a loaded shotgun in or on any vehicle on any highway. A shotgun is considered loaded if there is a shell or shells in the chamber, receiver or magazine.
- Set out carelessly to cause or start any prairie or forest fire or willfully injure any person or livestock with firearms while hunting or camping.
- Hunt, drive, or disturb game birds or game animals with or from any aircraft or boat propelled by power or sail.
- Take game birds or animals or to hawk except during the legal shooting or hawking hours.
- Hunt game birds with any swivel gun, rifle or pistol.
- Shoot or attempt to shoot any bird fish or other animal from an aircraft.
- Take crows by means other than firearms, bow and arrow and falconry.
- Carry a firearm, bow and arrow or other projectile device on a snowmobile, except when unloaded and in a case.
- Possess a pistol if under 18 years of age.
- Dig, cut or destroy natural or planted vegetation on any state-owned or controlled area.
- Cause game birds or game animals to depart from a game reserve or game sanctuary.
- Hunt, kill, take, trap or pursue or attempt to hunt, kill, take, trap or pursue any wild mammal or wild bird within a 200-yard radius of an inhabited dwelling or livestock feedlot, unless permission to do so has been granted by the owner or tenant of that dwelling.
- Shoot, take, hunt or kill or attempt to shoot, take, hunt or kill any wild animal or bird from or with a snowmobile.
- Take migratory game birds with a trap, snare, net, crossbow, rifle, pistol, swivel gun, shotgun larger than 10 gauge, punt gun, battery gun, fishhook, poison, drug, explosive or stupefying substance.

FUR HARVEST REGULATIONS

FURBEARERS IDENTIFIED

Animals designated as furbearers in Nebraska are: Red Fox, Badger, Beaver, Bobcat, Canada Lynx, Gray Fox, Long-tailed Weasel, Marten, Mink, Muskrat, Opossum, Raccoon, River Otter, Spotted Skunk and Striped Skunk.

TRAP TAGGING - NEW FOR 1995

It is unlawful to set any trap for furbearers or coyotes unless such trap has the following information stamped or inscribed legibly onto the trap or onto a metal tag that is securely affixed to the trap: (1) the valid driver's license number of the owner or user, individuals under 16 years of age may use the driver's license number of a parent or guardian, or (2) the Social Security number of the owner or user. Traps are defined to include snares, steel-jawed spring traps and box traps.

WHO NEEDS A FUR HARVEST PERMIT

All individuals, except Nebraska residents under 16 years of age, must have a Fur Harvest Permit to take or attempt to take furbearers by hunting or trapping. A Habitat Stamp is required for all nonresident fur harvesters and for all residents 15 years of age or older.

FURBEARER SEASONS			
Species	Inclusive Dates	Limits	Methods of Taking
Mink	Nov. 5-Jan. 31	No Limit	Trap Only
Raccoon, Opossum Long-tailed Weasel	Nov. 5-Jan. 31	No Limit	Hunt and Trap
Bobcat, Raccoon Opossum, River Otter	Nov. 5-Feb. 29	No Limit	Hunt and Trap
Red Fox, Gray Fox, Badger	Nov. 5-Feb. 29	No Limit	Hunt and Trap
Striped Skunk	No Open Season	No Take	No Take
Canada Lynx, Marten, River Otter, Spotted Skunk	No Open Season	No Take	No Take

RECIPROCITY REQUIRED

Nonresident permits for harvesting fur-bearing animals may only be issued to residents of states which sell similar permits to Nebraska residents. This permit is issued only by the Commission's Lincoln office.

WHERE TRAPPING IS PERMITTED

Permission of the landowner or operator is required to trap on private land or on public road rights-of-way where title is not held by the county. Although the entire state is open to trapping, this does not include lakes, marshes or other areas closed by federal, state or local laws or regulations.

All state wildlife management areas are open to trapping unless other-

wise posted. While trapping is prohibited on all state parks and state historical parks without special written permission, it is permitted on state recreation areas, in season, except within 100 yards of any developed facilities, such as picnic areas, campgrounds and boat ramps.

It is unlawful to trap or attempt to trap on any upland (dry land) portion of Branched Oak or Yankee Hill WMAs prior to Dec. 15.

Trapping is not permitted within 200 yards of any dwelling, feedlot or livestock (road or bridge) crossing without permission.

DISPOSAL OF FURS

All furs must be disposed of within 10 days after the close of the season. To retain furs longer, written permission must be obtained from the Game and Parks Commission. An affidavit must be filed with the Commission within 10 days after the close of the season, describing the numbers and kinds of furs to be held.

All furs shipped out of state by common carrier must have a special shipping tag available from any Game and Parks Commission office.

BOBCAT TAGGING

All bobcats taken must be registered and officially tagged by the Game and Parks Commission within two calendar days of the close of the season and before the pelt is sold. The skull or a portion of the lower jaw containing the front eight teeth, including both canine teeth, must be surrendered to the Commission at the time of tagging. Teeth need not be surrendered from bobcats prepared for mounting by licensed taxidermists.

LEGAL TRAPS/SETS

Furbearers may be trapped only with snares, metal spring traps with smooth jaws or box traps. It is unlawful to possess any live furbearers.

It is unlawful to use a Conibear-type trap with a jawspread larger than 5 inches except when placed under water or at least 6 feet above the ground on any lands owned or controlled by the Game and Parks Commission, U.S. Fish and Wildlife Service waterfowl production areas, U.S. Army Corps of Engineers lands at Harlan County Reservoir, or on any road rights-of-way. It is unlawful in Nebraska to use any Conibear-type trap with a jawspread over 8 inches unless it is totally under water or at least 6 feet above the ground.

During upland game bird seasons, it is unlawful to use snares on any lands owned or controlled by the Game and Parks Commission, on U.S. Fish and Wildlife Service waterfowl production areas, or on U.S. Army Corps of Engineers lands at Harlan County Reservoir.

It is also unlawful to use any baits in plain sight within 30 feet of foothold traps for furbearers set on dry land. Bait is defined as fish, animal flesh, fur, hide, entrails or feathers.

CHECK YOUR TRAPS

All traps set for furbearers must be checked as follows: one-way slide-wire crowning sets and all underwater Conibear-type sets, once every two calendar days, and all others every calendar day.

PROTECTED SPECIES

The following mammals are fully protected with no open seasons in Nebraska: Swift Fox, River Otter, Black-footed Ferret, Southern Flying Squirrel, Bighorn Sheep, Moose, Fallow Deer, Bear, Mountain Lion, Marten, Spotted Skunk and Canada Lynx.

DENS PROTECTED

It is unlawful to mutilate the dens or houses of any fur-bearing animal.

SUNRISE AND SUNSET SCHEDULE

PRESENCE OF SWIFT FOX (*Vulpes velox*) IN SOUTHWESTERN SOUTH DAKOTA

KENYON W. KRUSE, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007

JONATHAN A. JENKS, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007. Phone 605-688-6121; FAX 605-688-4515

EILEEN DOWD STUKEL, South Dakota Department of Game, Fish and Parks, 523 East Capitol, Pierre, SD 57501. Phone 605-773-4229; FAX 605-773-6245; email eileend@gfp.state.sd.us.

ABSTRACT

Carbon tracking plates and spotlighting were used to detect swift fox (*Vulpes velox*) in portions of Fall River and Shannon counties, South Dakota, during the summer of 1995. Twelve of 448 carbon plates placed in Fall River County were visited by swift fox, 7 during July and 5 during August. One swift fox den site with 3 pups was located. The site was later abandoned for unknown reasons. Swift fox were not detected during Fall River County spotlight surveys, although red fox, coyotes, skunks, raccoons, and a porcupine were detected. Two swift fox tracks were located on the surveyed area of the Pine Ridge Indian Reservation in Shannon County. One track was detected on a carbon plate and a second on natural substrate on the Pine Ridge Indian Reservation sample area.

INTRODUCTION

The swift fox distribution originally ranged from the prairies of Alberta-Saskatchewan, Canada to Texas-New Mexico region of North America (Scott-Brown et al. 1987). Present distribution ranges from Montana to Texas and New Mexico (Scott-Brown et al. 1987, Giddings and Knowles 1995). Factors considered related to the decline of the swift fox, especially in Canada and the northern United States, are settlement of the prairies, inadvertent poisoning from strychnine-laced baits, trapping pressure, rodent control programs, and capture by dogs (*Canis familiaris*) (Hillman and Sharps 1978, Scott-Brown et al. 1987).

The South Dakota distribution of swift fox is presumed to have included much of South Dakota (Jones et al. 1983). Recent records include sightings or den sites from 13 South Dakota counties (South Dakota Natural Heritage Database 1995; Figure 1). The swift was listed as a state threatened species in 1978, and its status remains unchanged.

The purpose of this research was to document swift fox presence in southwestern South Dakota using scent-post stations and spotlight surveys. Research was conducted from June through August 1995 in Fall River and Shannon counties, South Dakota.

STUDY AREA

Survey work was conducted on private lands in Fall River and Shannon counties, South Dakota. Fall River (451,477 ha; 1,115,584 acres [Kalvels 1982]) and Shannon (543,917 ha; 1,344,000 acres [Radeke 1971]) counties are located in southwestern South Dakota. Temperatures for the region average 21.1 C (70 F) for the June-August period; however, maximum temperature commonly exceeds 38 C (100 F) (Spuhler et al. 1971). Annual precipitation for the two county region averages 43 cm (17 in.), with about 77% falling during April to September.

Vegetation of southwestern South Dakota is typically short-grass prairie (Westin and Malo 1978). Grasses that dominate the prairies of the region include: little bluestem (*Andropogon scoparius*), prairie sandreed (*Calamovilfa longifolia*), and needle-and-thread (*Stipa comata*) (Westin and Malo 1978). Other grasses of the region are western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), and buffalograss (*Buchloe dactyloides*) (Deisch et al. 1990).

METHODS

Scent posts consisting of 0.61 X 0.61 m (2' X 2') 16 gauge sheet metal plates constituted the main survey method (Fig. 2). Scent posts were coated with a mixture of ethyl alcohol (because of its non-toxicity in case of accidental ingestion by an animal) and carbon (vegetable charcoal). The mixture (8-12 teaspoons carbon/liter of alcohol) was rolled on the sheet metal plates with a paint roller and allowed to evaporate (evaporation usually occurred within 2-30 seconds), leaving a thin coating of carbon. Jack mackerel (*Trachurus symmetricus*), one of the most effective attractants for swift fox (Woolley and Lindzey 1995), was placed in the center of the plate and an orange flag was positioned 25 paces from the plate to identify plate location. Scent posts were placed at 270 m intervals, except in unusual circumstances (e.g., where landscape or landowner boundaries interfered).

Scent posts were checked for disturbance (any change in the original carbon layer) in the afternoon the day after they were set. Signs of visitation were recorded and visible footprints were "lifted" from the plate by placing clear strapping tape over the footprint to transfer the remaining carbon, along with the image of the footprint, onto the tape (Fig 3). Plates were moved after 3 viable nights (nights in which the carbon coating was not disturbed by rain or heavy dew) to a new location. Several routes of scent posts were active for only 2 viable nights due to unusually persistent rain or other circumstances (e.g., scheduling difficulties).

Spotlighting was the second method used to locate swift fox. Lighting consisted of a roof mounted spotlight of about 250,000 candle power that was aimed to the right side of the vehicle and a 1.5 million candlepower hand-held spotlight that was used on the left side of the vehicle. Average travel speed was 24 kmph, and the majority of spotlighting occurred between sundown and 3:00 a.m. Spotlight surveys were conducted on routes where scent posts were located.

Local landowners were contacted before any survey work (scent posts and/or spotlighting) was conducted on their land. Landowners and other local people were interviewed as to recent sightings of swift fox.

RESULTS AND DISCUSSION

Between 22 April and 29 August 1995, a total of 27 landowners were contacted to ask for permission to conduct survey activities on their lands. Twenty-three landowners (85%) granted permission to conduct the survey. A total of 747 hours was worked over a period of 79 days. During this same period, rain disrupted tracking plates (see methods section) 21 days, which effectively lowered the number of "tracking" days to 58.

A total of 488 carbon plates was placed along transects during the working period; 12 plates were visited by swift fox. Seven plates were visited during the month of July, and 5 were visited in August. In addition, 2 prints were found in natural substrate during August.

Assuming the minimum home range for swift fox of 1.9 km^2 (Scott-Brown et al. 1987), approximately 150 km^2 (57.9 sq. mi.) were surveyed in May and June, 166 km^2 (64.1 sq. mi.) in July, and 178 km^2 (68.7 sq. mi.) in August. Visitation was calculated on a per km^2 basis using the area surveyed per month. Visitation of carbon plates was calculated at 0.0 visits/ km^2 in May and June, and 0.042 visits/ km^2 in July, and 0.028 visits/ km^2 in August. Using only tracks observed in natural substrate, visitation was calculated at 0.011 tracks/ km^2 in August.

On 7 July 1995, a swift fox den was located approximately 11.3 km (7 mi.) south and 17.7 km (11 mi.) west of Oelrichs, South Dakota (Fig 2). Two adults and 3 pups were observed at the den. The den was located on the southern apex of a north facing drainage in a grazed, shortgrass pasture and was approximately 3.2 km (2 mi.) from the nearest section line road. The den complex consisted of 3 excavations (dens), all facing north or west.

A red fox (*Vulpes vulpes*) den was observed 0.80 km (0.5 mi.) north of the swift fox den, and two coyotes (*Canis latrans*) were observed within 1.61 km (1 mi.) of the den. The den was revisited on 3 August 1995 and had been abandoned. The swift fox inhabiting the den site may have moved due to discomfort caused by fleas (Laurion 1988, Sharps 1989) or died during interactions with sympatric canids (coyote or red fox) (Ralls and White 1995). An abandoned swift fox den site was located 1.8 km (1.1 mi.) north of the active den site on 11 July 1995. The den appeared to be disturbed by a larger mammal. Coyote sign (tracks) were observed approximately 50 m north of the den site on the side of a hill facing the den site.

Spotlighting was conducted on 19 nights for a total of 36.5 hours and 558 km (347 mi.) traveled. During the month of June, spotlight surveys were conducted on routes where scent posts were located. In an effort to increase the sampled area that was surveyed, spotlighting occurred on county roads throughout Fall River County during July and August. No swift fox were sighted during spotlight surveys; however, unusually high vegetation may have reduced the movements and/or visibility of swift fox. Twelve red fox, 6 coyotes, 2 skunks (*Mephitis mephitis*), 2 raccoons (*Procyon lotor*), and 1 porcupine (*Erethizon dorsatum*) were sighted during spotlight surveys.

Arrangements were made with Parks and Recreation personnel of Pine Ridge Indian Reservation to survey for swift fox on 9 to 29 August. During this time period, 125 carbon plates were placed in eastern Shannon County, and 8 hours were spent spotlighting (covering 163 km [101 mi.]). Two tracks were found on Pine Ridge Indian Reservation (one of a carbon plate and one in substrate).

The U.S. Forest Service has been conducting surveys of swift fox presence on Buffalo Gap National Grassland in past years. During the summer of 1995, they observed swift fox sign in 3 areas not surveyed in this study (Hetlet 1995).

ACKNOWLEDGMENTS

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contract from the South Dakota Department of Game, Fish and Parks using hunting and fishing license revenues and Section 6 Endangered Species Act funding.

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FIGURE 1

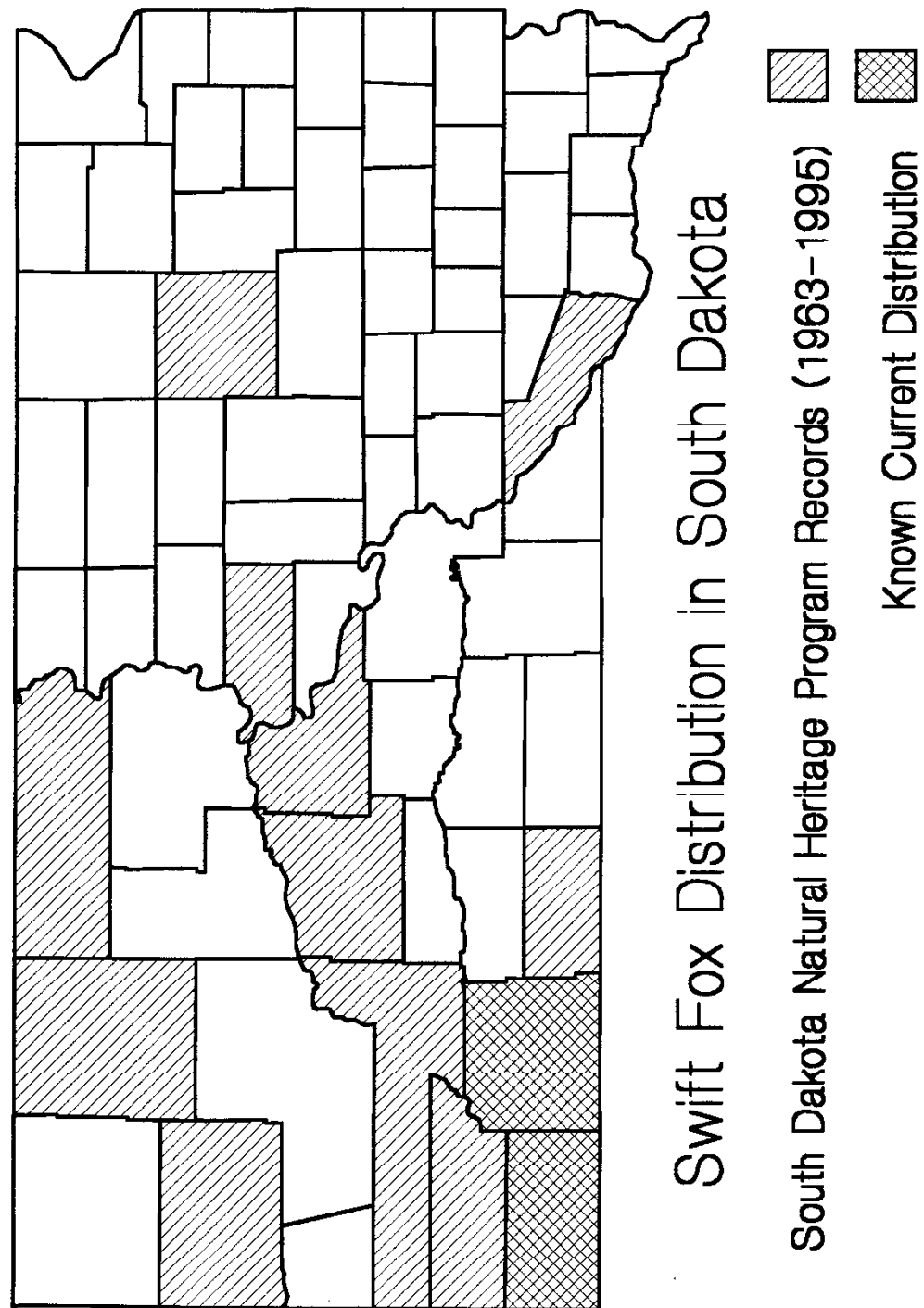
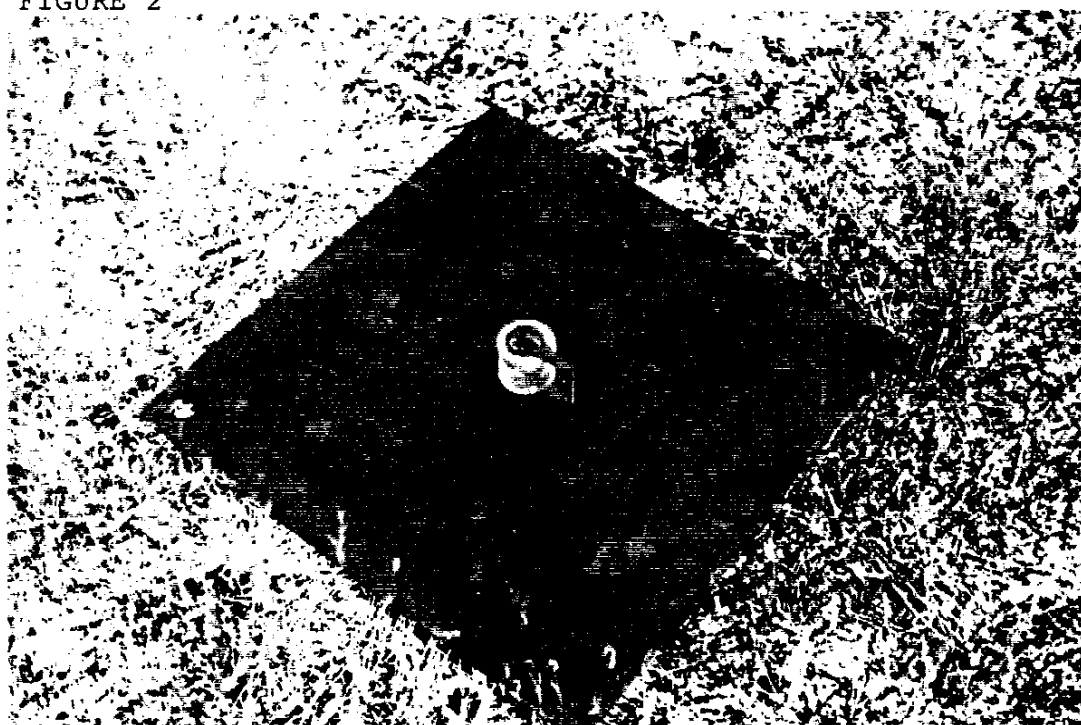


FIGURE 2

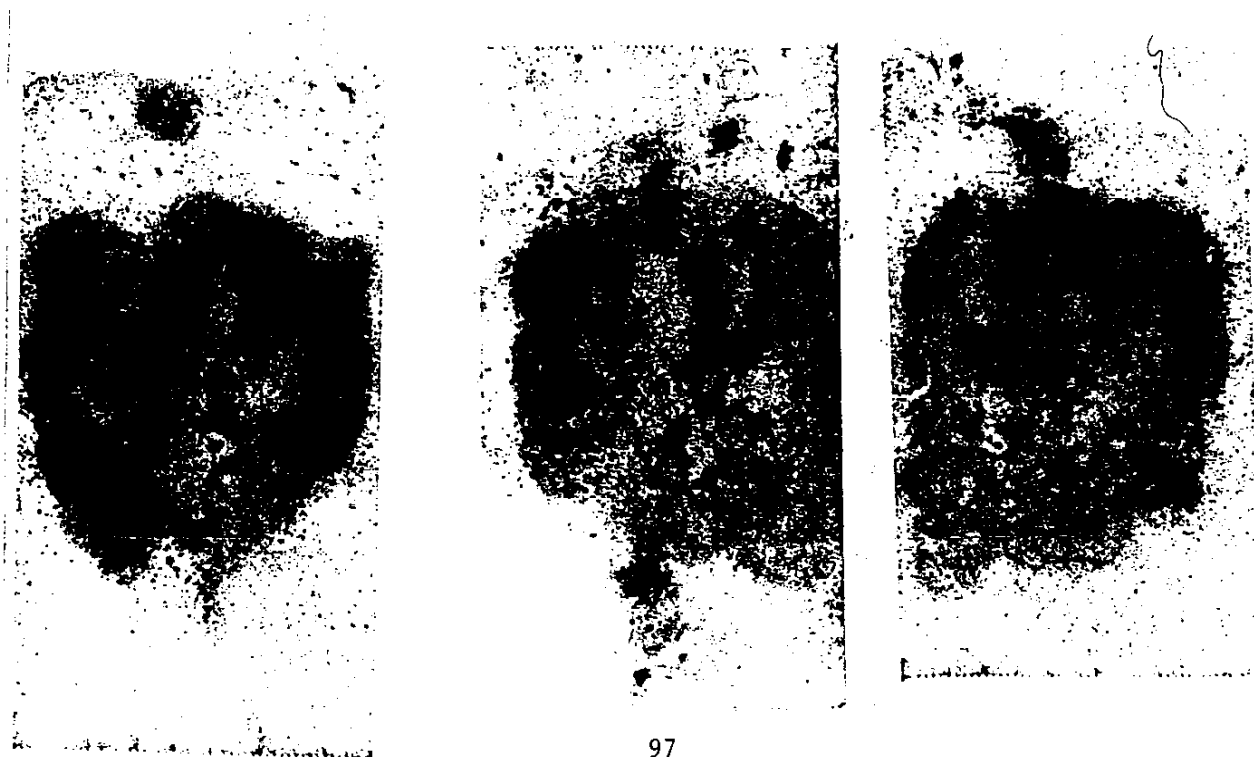


Scent plate with tracks
(strapping tape for size comparison)



Swift fox den (swift fox present)

FIGURE 3 - Sample of "lifted" swift fox tracks





FURBEARER SEASONS			
SPECIES	DATES	OPEN AREA	
Mink, Weasel	Nov. 4-Jan. 31	Statewide	
Muskrat	West River	Year-round	West River except Black Hills area described below.
	Black Hills	Nov. 4-April 30	Black Hills south of I-90, west of SD 79 and north of the Cheyenne River.
	East River	Nov. 4-March 31	East River north of I-90
Beaver	West River	Year-round	West River except Black Hills area described below.
	Black Hills	Nov. 4-April 30	Black Hills south of I-90, west of SD 79 and north of the Cheyenne River, except Black Hills National Forest land is closed.
	East River	Nov. 4-April 30	East River
Bobcat			
Fox, Badger, Raccoon, Opossum, Skunk, Coyote, Jackrabbit	Year-round	Statewide	

- Nonresidents may not take furbearers by trapping or with dogs.
- Seasons begin at sunrise of opening day and end at sunset of closing day.
- No trapping on or in muskrat houses of any size after March 1.
- Bobcat restrictions:

- Any person taking a bobcat must present it to a Conservation Officer or Extension Trapper for registration and tagging of the pelt within 5 days of capture.
- The pelt must be removed from the carcass, and the carcass must be surrendered to a Conservation Officer or an Extension Trapper.
- No person may buy or sell bobcat pelts that are not legally tagged.

FURBEARER REGULATIONS

Other rules on pages 18-22 may apply to furbearers.

CLOSED AREAS. Federal Refuges, National Monuments, State Game Refuges, Custer State Park, Adams Nature Area in Union County and Beaver Creek Nature Area in Minnehaha County or privately owned areas within them are closed to hunting and trapping of furbearers.

Snares are prohibited May 1-Nov. 13 on section line road rights-of-way statewide and on land east of the Missouri River owned, leased or controlled by Game, Fish and Parks, U.S. Fish and Wildlife Service or U.S. Bureau of Reclamation.

PROTECTED FURBEARERS. No person may take pine marten, swift fox, fisher or river otter. If any of these protected species are

accidentally caught and cannot be released, the entire carcass and hide must be turned in to a Game, Fish and Parks representative within 24 hours. Wolves, mountain lions and black bears are totally protected.

PERMISSION REQUIRED. No person may attach a trap, including snares, to any part of a fence along a public road right-of-way adjacent to private land without permission from the adjoining landowner.

No person, except the adjoining landowner or a person receiving written permission from the adjoining landowner, may trap on public road rights-of-way within 660 feet of a home, church or schoolhouse.

Snares may not be set within fenced pas-

tures, cropland, feedlots or fenced areas containing domestic livestock without permission of the landowner or the operator.

A person must have a permit issued by the park manager to trap in a state park or recreation area. The free permits are valid Nov. 1-March 31.

LEGAL SNARES. Snares must have a mechanical lock, swivel device on the anchor end, and stop device to prohibit the restraint loop from closing to a diameter less than 2 1/2 inches. Snares must be attached by the swivel directly to the anchoring device or by chain or cable between the swivel and the anchoring device. The swivel may not be more than 4 inches long. Attaching snares to a drag is prohibited.

It is unlawful to possess or transport snares not properly equipped except manufacturers may obtain a free Shipping and Transportation Permit from a Conservation Officer to ship or transport snares to another area that does not require the same equipment as South Dakota.

BODY GRIP TRAPS. Body grip or killer-type traps with a jaw spread of 8 inches or more are permitted only as water sets. Land sets are prohibited.

WATER SETS. Traps, except live traps and snares, cannot be placed or set in water or within 30 feet of water from Oct. 1-Nov. 3.

POLE TRAPS. No person may set or allow to be set any trap, snare or similar device on a pole or post in a manner that a raptor may be captured, injured or killed.

VISIBLE BAIT. Traps may not be set within 30 feet of exposed bait visible to airborne raptors. Exposed bait is meat or viscera of any animal, bird or fish with or without skin, hide or feathers.

COLONY TRAPS. The size of colony traps for muskrats may not exceed 12 inches in diameter and 36 inches in length.

BARBED HOOKS. Barbed hooks or other similarly sharpened instruments may not be used to take furbearing animals.

FLAGGING. No person may flag, mark or attempt to claim a muskrat house on public

lands or waters before sunrise on opening day of the trapping season. After the season is open, marking of muskrat houses is legal if the house contains an operational trap set.

TRAP CHECKING. Traps, including snares, must be checked at least every 48 hours and any caught animal removed.

TRAP VANDALISM. No person may steal, damage, or destroy someone else's trap or animal in a trap.

LIVE FURBEARERS. Possession of live furbearers is prohibited except that no more than one live furbearer (either a raccoon, jackrabbit, skunk, red or gray fox or coyote) per household may be kept as a pet. No pet furbearer may be physically altered except skunks may be descended. Sale or purchase of a pet wild furbearer is prohibited.

IMMEDIATE KILLING OR RELEASING OF FURBEARER. Except when kept as a pet, a furbearer taken from the wild must be either released or immediately and humanely killed.

RAW FURS. Raw furs may be kept after the close of the season if the furs are checked with a Conservation Officer within 10 days.

RESTRICTIONS. Except in Haakon, Jackson, Jones, Lyman and Stanley counties where these laws do not apply for muskrats, no person may:

- Hunt mink or muskrat with dogs.
- Dig, disturb or molest a mink den or beaver house to capture mink or beaver, or use poison, gas or smoke to kill or capture these animals.
- Shoot or spear muskrat.
- Destroy a muskrat house, except that in open season a house may be opened in a manner that will not destroy or damage it as a place of habitation.

HANDLING FURBEARERS

Due to the remote chance the furbearers you trapped may be carrying rabies, tularemia or plague, we encourage the wearing of latex/rubber gloves while skinning these animals. If you become ill and need medical attention after contact with a furbearer, be sure to notify your doctor that you have been working with wild animals.

THE CURRENT STATUS OF SWIFT FOX IN MONTANA

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ABSTRACT

Swift fox occurrence reports were compiled at a relatively low frequency (N=9) in Montana from 1978-1991. However, an increase in the frequency (N=17) and intensity of reports between 1992-1995 may suggest that a resident population presently occupies areas of the state. A preliminary statewide habitat assessment identified nearly 8,000,000 acres of prairie grasslands as suitable swift fox habitat.

INTRODUCTION

Numerous historical accounts appear to indicate that swift fox (*Vulpes velox*) were considered common residents to portions of Montana (Knowles and Dood 1993, Knowles et al. 1996). However, the last historical record in the state was reported by Bailey and Bailey in 1918. The absence of swift fox from state fur harvest data during a 16 year period led Hoffmann et al. (1969) to conclude that the species was extirpated in Montana. In 1978, the first swift fox specimen in 60 years was collected in southeastern Montana (Moore and Martin 1980). The species was classified as a state furbearer in 1979, providing limited protection through a closed harvest season (Appendix 1). Recent occurrence reports (N=26) compiled since 1978 provide over 40 confirmed and unconfirmed swift fox observations in Montana.

Approximately 16,000,000 acres of prairie grasslands in Montana have been converted to agricultural crop production (National Agricultural Land Study 1981). This conversion of grasslands is considered to have resulted in a loss of swift fox habitat and a highly fragmented landscape. Little information is presently available concerning the distribution or amount of grasslands considered to be suitable swift fox habitat in Montana.

Populations of swift fox currently exist in several states and Canadian provinces adjacent to Montana. South Dakota and Wyoming have maintained endemic populations while Canada's reintroduction program initiated in 1983 has propagated a wild population in Alberta and Saskatchewan along the border area with Montana.

The U.S. Fish and Wildlife Service (USFWS) lists the swift fox as a candidate species throughout its range under the ESA. A recent listing decision by the USFWS provides states within swift fox range an opportunity to initiate recovery efforts through the implementation of a species conservation strategy. Information in this report provides preliminary species and habitat data that will be used to address conservation strategy objectives for Montana.

METHODS

Species observation or occurrence reports have been compiled by Fish, Wildlife and Parks (FWP) personnel on swift fox since 1978. An occurrence/distribution report form replaced a standard observation card in 1992. Unsolicited reports and solicited information were received from private

individuals and government agency personnel. Information collected on each occurrence report includes the date and type of observation, site location, legal description, and county, with a remarks section to describe observation circumstances and identifying species characteristics. Reports are categorized as confirmed (collected specimen, traded pelts, photographs, marked animals) or unconfirmed (visual observations, uncollected specimens). Reports not currently on file with FWP have been collected and compiled by Knowles et al. (1996).

A statewide assessment of swift fox habitat was conducted by FWP in May 1994 to identify large blocks of prairie grassland. Aerial surveys were primarily used to locate and map grasslands while some areas were examined by vehicle. Land ownership patterns were also identified at this time. Suitable swift fox habitat was generally defined as extensive in size (preferably over 100,000 acres), with relatively level topography, and with greater than 50% of the area undisturbed by agriculture. Site specific criteria were also examined which followed the Canadian habitat assessment methods developed by Mamo (1987). Identified prairie grassland areas were delineated on 1:250,000 BLM resource maps. These maps were integrated with a Montana land use status map provided by the Montana State Library's Natural Resource Information System (NRIS) to produce a grasslands habitat map.

RESULTS

A total of 26 swift fox occurrence reports have been compiled in Montana since 1978 (Table 1). These reports represent a minimum of 42 single and multiple species observations. Thirteen reports are considered confirmed and 13 unconfirmed. All reports are visual observations with no reports based on track or scat identification. A detailed descriptive narrative of these reports is presented in Knowles et al. (1996). Figure 1 illustrates the general location of occurrence reports in Montana for the 1978-1995 period.

Occurrence reports have been compiled at a relatively low frequency ($N=9$) during the 13 year period between 1978-1991. An increase in the frequency ($N=17$) and intensity of reports apparently occurred between 1992-1995. Examining reports during the 1992-1995 period, 11 of the 17 reports and 66% of the confirmed reports are from northcentral Montana. Reports from Blaine, Phillips and Valley counties appear to be most consistent with an increasing incidence of confirmed reports.

One swift fox carcass received in 1994 and two carcasses received in 1995 from northcentral Montana were presented for lab analysis. Of the two male and one female specimens, none had evidence of ear tattoos which are present in all reintroduced foxes in Canada (Carbyn, pers. comm.). Two reports and personal communications with local residents indicate that natal swift fox dens are present south of the Canada/US border in northcentral Montana.

The statewide habitat assessment conducted in 1994 identified a total of 8,000,000 acres of suitable swift fox habitat in Montana. The approximate size and distribution of the prairie grassland areas meeting specific habitat criteria are delineated in Figure 2.

The largest tract of grasslands is located in northcentral Montana. This area extends from Chinook east to Glasgow and from the Canadian border south to the Missouri River. Over 50% of the land is administered by the Bureau of Land Management or within the Fort Belknap Indian Reservation. Approximately 1,700,000 acres of grasslands are located north of the Milk River and 1,600,000 acres of grasslands are present between the Milk and Missouri Rivers. However, small portions of the area are in agriculture or do not represent suitable swift fox habitat, specifically the Bear Paw and Little

Rocky Mountain ranges. This particular block of grassland appears significant because it is adjacent to swift fox release sites in Alberta and Saskatchewan and it provides the majority of recent confirmed occurrence reports. Also in northcentral Montana, nearly 400,000 acres of grassland habitat surrounds the Sweetgrass Hills. Coues reported swift fox in this region during his survey in the late 19th century (Knowles et al. 1996).

Another large block of prairie grassland is located along the Rocky Mountain front which includes the Blackfeet Indian Reservation and extends south to the Choteau area although at this point it becomes increasingly fragmented by agriculture. This grassland block represents approximately 1,600,000 acres of potential swift fox habitat. It is significant that this extensive area of grasslands also corresponds to some of the best historical data on swift fox abundance in Montana (Knowles et al. 1996).

A less extensive area (over 600,000 acres) of grasslands exist south of the Little Belts, Big Snowy, and Little Snowy Mountain ranges. This area was crossed by Grinnell in 1875 on his survey route where swift fox were observed (Knowles et al. 1996). Similar grassland habitat is also found along the eastern and southern portions of the Crazy Mountains, although this area appears to be topographically marginal as swift fox habitat.

In southeastern Montana, Carter County contains at least 600,000 acres of grasslands that appear suitable for swift fox. Small scattered blocks of grasslands also exist between the Missouri and Yellowstone Rivers, representing 800,000 acres of potential habitat, located primarily in Prairie and Dawson counties. Several of the recent swift fox reports are either from or in close proximity to these blocks of grasslands. Allen and Grinnell traveled through much of this area in the 1870's and reported swift fox in this region (Knowles et al. 1996).

Funding for swift fox work in Montana is from state license fees and federal aid to fish and wildlife management (Pittman-Robertson). Total estimated costs of swift fox population/habitat survey and inventory work in Montana through 1995 is approximately \$5,000 - \$6,000.

DISCUSSION

The series of swift fox reports since 1978 would suggest that swift fox have recently occurred in Montana as dispersing individuals or in small resident populations. Evidence of swift fox recolonizing their original range in the U.S. has been reported (Samuel and Nelson 1992). Existing swift fox populations in surrounding states and provinces, adjacent to Montana, should be recognized as a natural source of dispersing animals. Brechtel et al. (1993) reported that seven townships in northcentral Montana provided relocations of Canadian released swift fox by either radio telemetry, recovered carcasses, or confirmed reports between 1987 and 1991. Swift fox are apparently considered active dispersers (FaunaWest 1991, Kannowski, pers. comm.).

Unmarked swift fox specimens collected from Blaine, Phillips and Garfield counties in northcentral Montana in 1994-1995 provide evidence that dispersers or resident animals do occupy Montana. The report from Blaine County involved three animals trapped (1 collected, 2 released) in November of 1994 within the same general location. It is also of interest that the site-specific locations of each occurrence report corresponds to available grassland habitat. An increase in the frequency and intensity of occurrence reports during 1992-1995 would seem to indicate that a resident swift fox population now occupies northcentral Montana, and possibly other areas of the state.

The statewide habitat assessment provided sufficient evidence that suitable swift fox habitat is available in Montana. Identified grassland areas totaled nearly 8,000,000 acres and comprise portions of the regions where swift fox were reported to occur in the 1800's and early 1900's. The two primary factors which are considered to have contributed significantly to the historical decline of the swift fox, predator and rodent control with toxicants, have generally been discontinued in Montana. However, the ecological community of the grassland environment may be in an altered state, with the niche once occupied by swift fox restricted by decreased prey availability or increased competition with coyotes (*Canis latrans*) and red fox (*Vulpes vulpes*).

A majority of the recent swift fox occurrence reports in Montana correspond to the suitable grassland areas designated in the habitat assessment. However, reports of swift fox in other areas suggest that the species may be more broadly adapted to topography, vegetation, and agricultural disturbance than the criteria used in our habitat survey. The possibility also exists that swift fox have the ability to use small areas of habitat, or that some occurrence reports only represent dispersing individuals with little relevance of location to specific habitat type.

Although it seems likely that many of the recent swift fox occurrence reports are dispersing individuals from populations adjacent to Montana, at least one resident population probably now exists in northcentral Montana. Continued species dispersal movements into Montana could be expected to produce additional resident populations in the state. The increase in frequency and intensity of reports in northcentral Montana indicates that these swift fox are present as a result of the Canadian reintroduction effort. The series of recent swift fox reports on the Fort Belknap Indian Reservation may also be indicative of a population in this area. The specific locations of swift fox occurrence reports since 1978, and particularly from the 1992-1995 period, should serve as a starting point for initiating systematic surveys (presence/absence and distribution) to document resident swift fox populations in Montana.

Anticipated costs of research and management activities during the 1996 calendar year are expected to be in the range of \$5,000. - \$10,000. This includes funding for personnel and equipment to determine swift fox distribution and documenting resident populations through marked animals and the presence of natal dens.

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Table 1. Recent records or observations of swift foxes in Montana.

Date	Location	Type of observation	Source
1978 5 Mar.	Tongue River N. of Ashland T2N,R45E,S12	trapped specimen Adult M	Moore and Martin 1980
1982	N. of Circle T22N,R48E	trapped specimen lost	R. Stoneberg pers. comm. (FW&P biologist)
1984 Jan.	N. of Broadus	trapped Adult F	Henckel 1984
1984	E. of Glendive T15N,R58E,S2	trapped specimen Adult	Vallard 1985
1985-6	Gilford, NW of Havre on Sage Creek	trapped skin traded	Carbyn and Killaby 1989
1985-6	Hogeland	visual	Carbyn and Killaby 1989
1985-6	Chinook	trapped	Carbyn and Killaby 1989
1989 11 June to 31 Aug.	Glacier Nat. Park, Cutbank Ranger Sta.	visual radio collar	S. Gniadek pers. comm. (NPS biologist)
1987- 1991	northern Montana	summary report	Brechtel et al. 1993
1992 31 Jul.	S. of Opheim,	visual radio collar	Henckel 1992
1992 24 May	S. of Wilsall T3N,R9E,S29	visual	D. Quimby pers. comm. (retired mammologist MSU)
1992 9 July	S. of Terry T11N,R51E,S34	visual den	B. Heidel pers. comm. (Nat. Heritage Program Botanist)

Table 1.cont.

1992 spring	S. of Fort Belknap Agency T32N,R23E,S4	visual 2 obs.	M. Fox pers. comm. (Ft. Belknap Fish & Wildlife)
1992	Richey	visual & trapped, 2 or 3 skins traded	A Dood pers. comm. (FW&P biologist)
1992	Malta HWY 2	road kill not coll.	A. Dood pers. comm. (FW&P biologist)
1993 April	W of Wilsall T3N,R7E,S21	visual	A. Harmata pers. comm. (biologist MSU)
1993 May	N. of CMR HWY 191 T23N,R23E,S25	road kill not coll.	F. Klien, pers. comm. (U.S. FWS volunteer)
1993 2 Jul.	Tongue River S. of Ashland T3S,R23E,S21	visual	J. Spang pers. comm. (Northern Cheyenne Dept. of Natural Resources)
1993 Nov.	S. of Fort Belknap Agency T31N,R23E,S17	visual & photo	M. Fox pers. comm. (Ft. Belknap Fish & Wildlife)
1994 Jan.	S. of Terry T8N,R52E,S28	visual 2 obs.	S. Heuther pers. comm.
1994 June	SE of Fort Belknap Agency T31N,R24E,S29 T30N,R24E,17	visual 4 obs. includes pups at a den	K. Jones, & A. Healey pers. comm.
1994 Sept.	S. of Fort Belknap Agency T30N,R23E,S15	visual	M. Fox pers. comm. (Ft. Belknap Fish & Wildlife)
1994 Nov.	N. of Chinook T37N,R18E,S11&12 T36N,R20E,S24	3 trapped 1 collected 2 released	J. Peters pers. comm. (BLM biologist)
1995 27 Jan.	northern Garfield Co. T20N,R36E,S3	1 trapped & collected	B. Giddings pers. comm. (FW&P biologist)

Table 1.cont.

1995 24 Feb.	10 km SW White- water T34N,R31E,S21	1 road-killed collected	B. Giddings pers. comm. (FW&P biologist)
1995 June	N. of Lodgepole T27N,R25E,S32	visual	P. Bigby pers. comm. Fort Belknap Lands Dept.

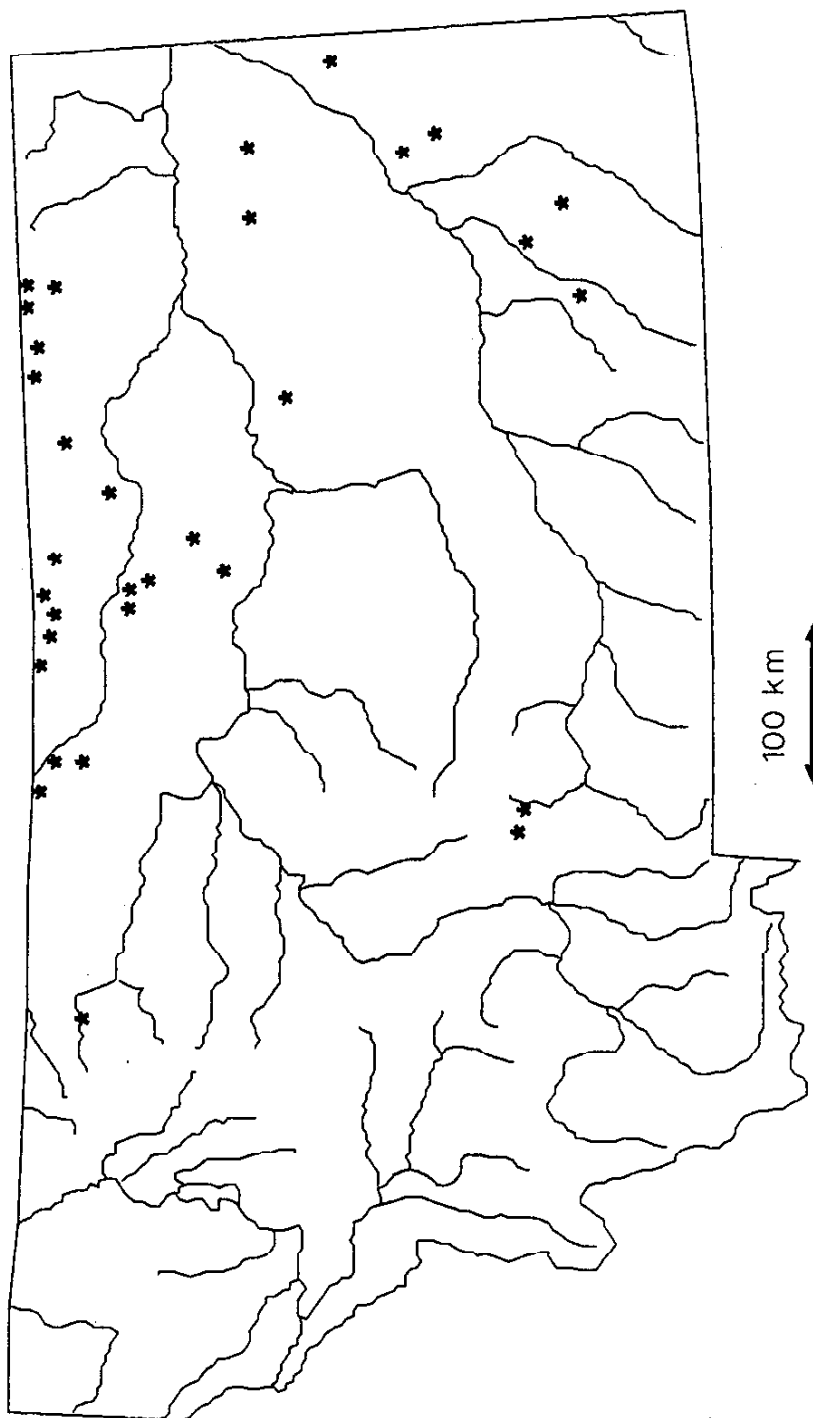


Figure 1. Approximate location of confirmed and unconfirmed swift fox observations (dots) recorded in Montana from 1978 to present.

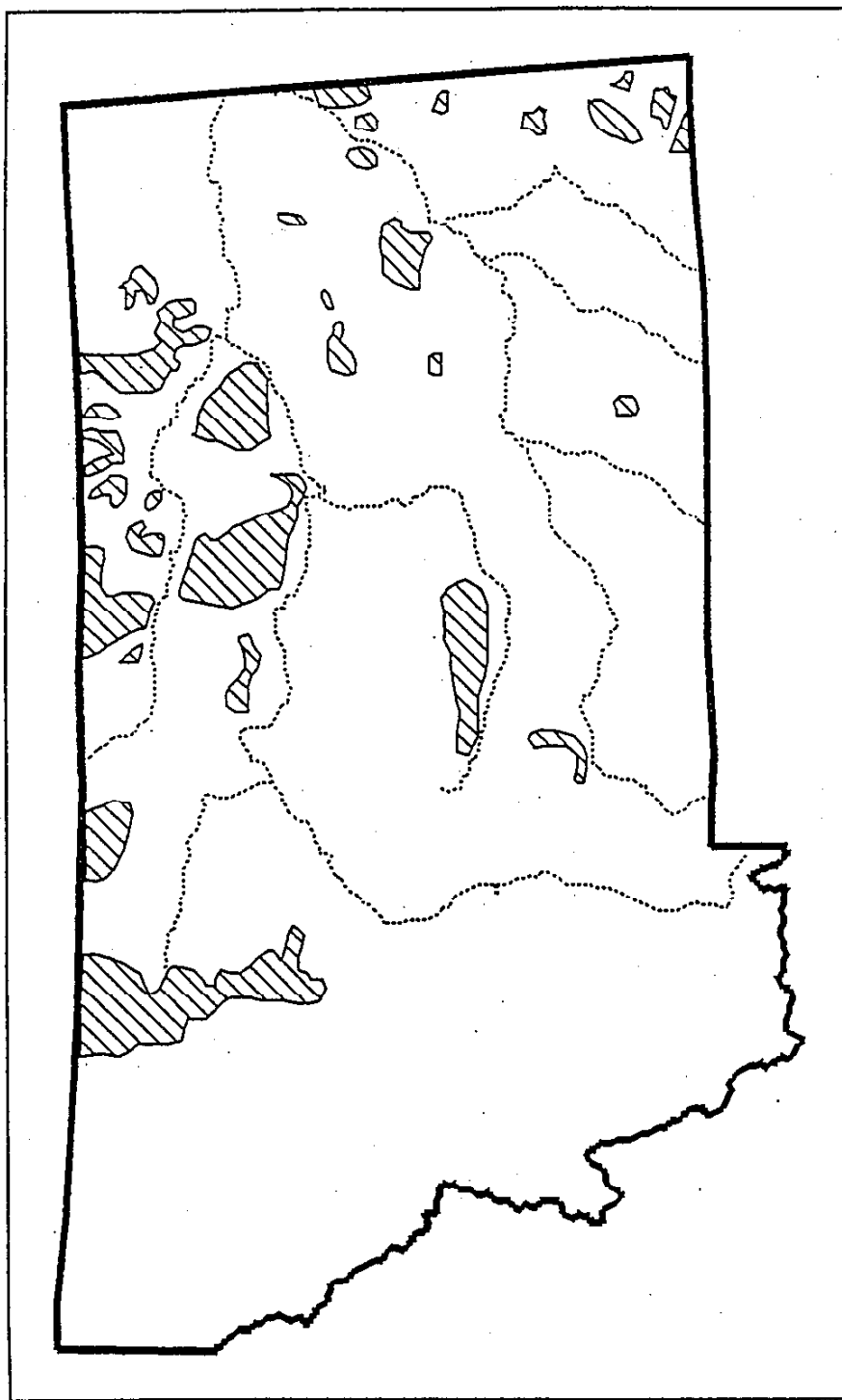


Figure 2. Distribution of potential suitable swift fox habitat in Montana based on vegetation and topography.

FURBEARERS

1994 & 1995

TRAPPING & HUNTING REGULATIONS STATE OF MONTANA

Furbearer trapping and hunting regulations are adopted on a biennial basis. The seasons, limits and regulations listed herein are valid through June 30, 1996.

DEFINITIONS

Furbearing animals are defined by law as beaver, otter, muskrat, mink, marten, fisher, wolverine, bobcat, lynx and swift fox. **ONLY RESIDENTS MAY TRAP OR HUNT FURBEARERS, LICENSE REQUIRED.**

Predatory animals are coyote, weasel, skunk and civet cat (spotted skunk). **LICENSE REQUIRED FOR NONRESIDENT TRAPPERS ONLY.**

Nongame wildlife means any wild animal not otherwise legally classified by statute or regulation in Montana. Examples of nongame wildlife with commercial value are badger, raccoon, and red fox. **LICENSE REQUIRED FOR NONRESIDENT TRAPPERS ONLY.**

Fur dealer is defined as any person or persons, firm, company or corporation engaging in carrying on, or conducting wholly or in part the business of buying or selling, trading or dealing within the State of Montana, in the skins or pelts of any animal or animals, designated by the laws of Montana as furbearing or predatory animals, shall be deemed a fur dealer within the meaning of the act. If such fur dealer resides in or if his or its principal place of business is within the State of Montana, he or it shall be deemed a resident fur dealer. All other fur dealers shall be deemed nonresident fur dealers.

GENERAL REGULATIONS

Licenses — The following licenses are available at Fish, Wildlife and Parks offices in Kalispell, Missoula, Bozeman, Great Falls, Billings, Glasgow, Miles City, and Helena.

Conservation (required prerequisite) — \$4.00 Resident and \$5.00 Nonresident.

General Trapper — \$20; available only to resident conservation license holders 13 years of age or older.

Youth Trapper — \$3; available only to resident conservation license holders 6 through 12 years of age. Valid for mink and muskrat.

Landowner Trapper — \$1; applicants must give legal description of land owned or leased, name, address, and resident conservation license number.

Nonresident Trapper — \$250; available only to nonresident conservation license holders 13 years of age or older, whose state of residence has nonresident trapper licenses available to Montana trappers. Valid for predatory animals and nongame wildlife.

A license is not required for resident trappers/hunters or nonresident hunters to take predatory animals and nongame wildlife.

Fur Dealer's — Resident— \$10; Agent— \$10; Nonresident— \$50.

License Validation — Bobcat, lynx, and wolverine may be taken only by resident trappers or hunters with a validated trapper's license. Validation indicates that the licenseholder may take these species. Validation available without charge at Fish, Wildlife and Parks offices prior to December 1.

Taking of furbearing animals during the open season by any means other than trapping or snaring is prohibited, unless otherwise stated.

GENERAL REGULATIONS (cont.)

Hunting — Bobcat, lynx and wolverine may be taken by hunting (MCA Sec. 87-2-601), but no other animals defined by law as furbearing animals.

Dogs — Dogs may be used to take bobcat (MCA Sec. 87-3-124), but no other animals defined by law as furbearing animals.

Checking and Placing Traps — Traps should be checked at least once every 48 hours. It is the trapper's responsibility to check his/her traps regularly. Failure to pick up snares or traps at the end of the trapping season or attending them in a manner that wastes furbearing animals constitutes a misdemeanor.

To prevent accidental trapping of raptors, no trap or snare may be set within 30 feet of an exposed carcass placed in a manner that can be seen by soaring raptors. **EXEMPTION:** trappers employed or contracted by a government agency in the official performance of their duties. **Exposed carcass or bait** is defined as the meat or viscera of a mammal, bird or fish, or any part thereof more than one pound in weight. Bleached bones are excluded.

Trap Identification — Metal identification tags that bear the name and address of the trapper must be fastened to all traps and snares. Tags should be attached to the end of the snare, chain, or other anchoring material at the end farthest from the portion of the device which holds the animal. Snares must also have telephone numbers included on the tag. Landowners who trap on their own lands and irrigation rights-of-way contiguous to their land do not need to tag traps or snares.

Disturbing Traps — It is unlawful to destroy, disturb or remove any trap, snare or trapped animals belonging to another trapper without permission.

Live Furbearers — Live furbearing animals may not be possessed except under the provisions of the fur farm or roadside zoo permits. It is unlawful to capture wild furbearers for fur farm stock.

Carcasses (Lynx, Wolverine, Fisher, and Swift Fox) — It is mandatory that the entire and intact carcass of all lynx, wolverine and fisher be turned in to the Department of Fish, Wildlife and Parks in good condition, at the time the pelt is presented for tagging. Good condition is defined as fresh or frozen and securely wrapped in such a manner as to have prevented decomposition in order that all tissue samples shall be suitable for lab analysis. Any lynx, wolverine or fisher pelt that is presented for tagging without the carcass in good condition shall be subject to confiscation.

The complete carcass (including pelt) of accidentally trapped swift fox must be turned in to Fish, Wildlife and Parks personnel if the animal cannot be released uninjured.

Destroying Muskrat and Beaver Houses — It is unlawful for any person to willfully destroy, open or leave open, a muskrat or beaver house. This shall not prohibit trapping in muskrat houses when authorized by the Commission.

Tagged Furbearers — A number of furbearing animals have been tagged for scientific study. If one of these animals is captured, please notify the nearest game warden or regional office of the tag number or numbers and the locality of the capture.

Non-Target Species — Protected birds or animals found in traps, uninjured, shall be released on site. Species in need of rehabilitation shall be removed and immediately presented to a Fish, Wildlife and Parks office, local warden, or biologist. Dead animals should be left at the trapping site and immediately reported to a Fish, Wildlife and Parks office or field personnel for disposition. When either a Fish, Wildlife and Parks office or field personnel cannot be reached, trappers may report the above information by calling 1-800-332-6117.

Landowner Permission — Resident trappers should obtain permission of landowners before trapping on private land. Nonresidents must obtain written permission from the landowner, lessee or their agent before trapping or snaring predatory animals and nongame wildlife on private property.

It is unlawful to set snares on private property without the landowner's consent. Snares must be set in a manner and at a time so as not to duly endanger livestock. A trapper who injures livestock in a snare is liable for damages.

GENERAL REGULATIONS (cont.)

Criminal Trespass to Property — Montana law states that lands can be closed to the public either by posting the land or through verbal communication by landowners or their agents. However, even if lands are not posted, resident trappers should seek landowner permission before pursuing any activities on private lands. If permission is granted, the landowner may revoke the permission by personal communication at any time.

Preserves, Parks, Department Lands — All state game preserves are open to trapping. Trapping on Fish, Wildlife and Parks lands and Wildlife Management Areas will be allowed by written authorization of the area manager or a department employee on lands not having a resident manager. Beaver Creek Park open to trapping by permission only obtained from Hill County Park Board.

School Trust Land — A special use license is required to trap on these lands. Contact a Department of State Lands office for further information.

Closures — All National Parks, National Wildlife Refuges, and Indian Trust or Tribal Trust lands are closed to trapping except as otherwise specified. Permits to trap on National Wildlife Refuges or Indian Reservations may be issued by the Refuge office or Indian agency.

National Wildlife Refuges — More restrictive regulations may apply to national wildlife refuges open to public trapping. For additional information on federal regulations, contact Special Agent-in-Charge, U. S. Fish and Wildlife Service, POB 25486, Denver Federal Center, Denver, CO 80225 (303-234-4612) or the local refuge manager.

Indian Reservations — Tribal governments may have adopted trapping regulations within the exterior boundaries of their respective reservations. Trappers should be aware that tribal regulations may differ from the statewide trapping regulations adopted by the Montana Department of Fish, Wildlife and Parks Commission. The question of state-tribal jurisdiction has not been resolved.

Recorded or Electronic Devices — It is unlawful to use any recorded or electrically amplified bird or animal calls or sounds or imitations of bird or animal calls or sounds to assist in the hunting, taking, killing or capturing of any wildlife except predatory animals.(M.C.A., Sec. 87-3-108).

Pelt Possession — It shall be unlawful for any fur dealer or fur dealer agent to purchase or possess any untagged marten, fisher, wolverine, bobcat, lynx or otter pelt, except those untagged furs originating outside Montana, when accompanied by an export permit or other documentation of lawful acquisition.

Export — A federal export permit is required in addition to a Montana state tag before the pelts of bobcat, lynx, and otter may be exported from the United States. Apply to U.S. Fish and Wildlife Service, 600 Central Plaza, Room 209, Great Falls, MT 59401.

Penalties — Persons convicted of knowingly taking, possessing or transporting furbearers or pelts in violation of the rules or laws, shall be fined not less than \$50 or more than \$1,000, imprisoned in the county jail for not more than 6 months, or both. In addition, such person shall forfeit his privilege to hunt, fish or trap for not less than 24 months. Civil restitution from \$100 to \$500 may be assessed for each illegal animal or pelt.

QUOTAS/SEASON CLOSURES

Current harvest information may be obtained by calling the appropriate Fish, Wildlife and Parks Regional headquarters during normal business hours.

ASK FIRST!
to Hunt, Fish and Trap on Private Land

PELT TAGGING

Otter, marten and wolverine pelts must be tagged by Fish, Wildlife and Parks personnel residing in the trapping district where animal was taken no later than 10 days after close of the open season.

Bobcat, lynx and fisher pelts must be tagged by Fish, Wildlife and Parks personnel residing in the trapping district where animal was taken within 72 hours of taking. Trappers or hunters unable to comply with the tagging requirements due to special or unique circumstances must report their harvest and make arrangements for tagging to the proper regional office or by calling 1-800-332-6117 during office hours (8 a.m. to 5 p.m.) within 72 hours of taking. Pelts not registered or presented to department personnel within 72 hours are subject to confiscation.

The species, trapping district, date and tag number will be permanently recorded on the back of the trapper's license when pelts are tagged.

FURBEARER SEASONS

The state has been divided into seven legally described trapping districts, designated by numbers, wherein the season dates, limits, and species of furbearers which may be taken are specified.

BEAVER — STATEWIDE SEASON DATES: November 1 - April 15 of the following year, except state Wildlife Management Areas and specific closures (See SPECIAL REGULATIONS and CLOSURES).

Beaver that have been legally trapped can be dispatched with firearms.

Owners and lessees of real estate being damaged by beaver may apply for a permit to trap beaver under provisions of the law. Please see your local game warden for further information.

Trappers participating in a beaver damage complaint must have in their possession the damage permit issued to the landowner or a copy during trapping activities.

OTTER — STATEWIDE SEASON DATES: November 1 - April 15 of the following year, except state Wildlife Management Areas and specific closures. (See SPECIAL REGULATIONS and CLOSURES).

Limit — Persons may take and possess one (1) otter each per season (See PELT TAGGING).

The otter season on the Flathead Indian Reservation is closed to all trappers (members and non-members).

MUSKRAT — STATEWIDE SEASON DATES: November 1 - April 15 of the following year, except state Wildlife Management Areas (See SPECIAL REGULATIONS).

Traps may be set in muskrat houses provided the part removed is replaced after insertion of the trap and after removal of the trap. It is unlawful for any person to willfully destroy, leave open or partially destroy any muskrat house.

MINK — STATEWIDE SEASON DATES: November 1 - April 15 of the following year except state Wildlife Management Areas (See SPECIAL REGULATIONS).

MARTEN — SEASON DATES TRAPPING DISTRICT 1 through 5: December 1 - February 15 of the following year. (See PELT TAGGING).

Trappers taking marten must present the skull in good condition at the time of pelt tagging for the purpose of aging the marten. The skull will be retained by the Department of Fish, Wildlife and Parks for processing and examination and then returned to the owner, if desired. Good condition is defined as fresh or frozen and securely wrapped in such a manner as to have prevented decomposition in order that it shall be suitable for lab analysis.

FURBEARER SEASONS (cont.)

FISHER — SEASON DATES TRAPPING DISTRICT 1: December 1 – December 31. Season will close on 48 hours notice when district total of five (5) fisher are taken, but not later than December 31.

SEASON DATES TRAPPING DISTRICT 2: December 1 – February 15 of the following year. Season will close on 48 hours notice when district quota of five (5) fisher are taken but no later than February 15.

Limit – Persons may take and possess one (1) fisher each per season. (See PELT TAGGING and CARCASSES).

Accidentally trapped fishers that cannot be released uninjured must be turned in to the Montana Fish, Wildlife and Parks.

WOLVERINE — SEASON DATES TRAPPING DISTRICTS 1 through 5: December 1 – February 15 of the following year. License validation required (See LICENSE VALIDATION).

Limit – Persons may take and possess one (1) wolverine each per season. (See PELT TAGGING and CARCASSES).

BOBCAT — STATEWIDE SEASON DATES: December 1 – February 15 of the following year. License validation required. (See LICENSE VALIDATION). Season will close on 48 hours notice upon reaching the trapping district quota or state quota or on February 15, whichever occurs first.

Limit - Persons may take and possess seven (7) bobcats each per season in Trapping Districts 1 through 5. Persons may take and possess ten (10) bobcats each per season in Trapping Districts 6 and 7. No trapper can possess more than ten (10) bobcats. (See PELT TAGGING).

District	1	2	3	4	5	6	7	Statewide
Quota	150	140	100	175	150	100	600	1,415

Trappers/hunters taking a bobcat must present the skull in good condition at the time of pelt tagging for the purpose of aging the bobcat. The skull will be retained by the Department of Fish, Wildlife and Parks for processing and examination and then returned to the owner, if desired. Good condition is defined as fresh or frozen and securely wrapped in such a manner as to have prevented decomposition in order that it shall be suitable for lab analysis.

The bobcat season on the Flathead Indian Reservation is closed to all trappers (members and non-members).

Chasing bobcat by properly licensed houndsmen (Lion Chase Permit) is permitted from December 1 – April 30 of the following year. Houndsmen and other hunters with a validated trappers license are allowed to take bobcat during the period trapping season is open.

Trapper Education

Resident trappers are encouraged to participate in the voluntary trapper education program.

FURBEARER SEASONS (cont.)

LYNX — SEASON DATES TRAPPING DISTRICTS 1 through 4: December 1 – February 15 of the following year. License validation required (See LICENSE VALIDATION). Lynx season will close on 48 hours notice upon reaching the trapping district quota or state quota or on February 15, whichever occurs first.

Limit: Persons may take and possess one (1) lynx each per season. (See PELT TAGGING and CARCASSES).

Trapping District 1 and 2 have a quota of one (1) lynx; Trapping Districts 3 and 4 have a quota of one (1) lynx. STATEWIDE QUOTA IS TWO.

Accidentally trapped lynx that cannot be released uninjured must be turned into the Montana Fish, Wildlife and Parks.

The lynx season on the Flathead Reservation is closed to all trappers (members and nonmembers).

SWIFT FOX — CLOSED SEASON. Accidentally trapped swift fox that cannot be released uninjured must be turned into the Montana Fish, Wildlife and Parks (See CARCASSES).

SPECIAL REGULATIONS

Mt. Haggin Wildlife Management Area — The Mt. Haggin Area consists of trapping units where a quota of three (3) licensed trappers shall be permitted to trap one limit of furbearers, including ten (10) beaver. Trappers will be selected by a random drawing. Trappers will be able to select an area to trap in the order of names drawn. The last trapper selected will not have a choice but will be assigned an area. All trapping permits are valid through April 15. Trappers wishing to take predators must contact Mike Frisina for a trapping permit. Applicants must submit their name, address, phone number, and trapper's license number by September 15 to:

Mike Frisina, Department of Fish, Wildlife and Parks,
1330 West Gold Street, Butte, MT 59701

Freezout Lake Wildlife Management Area — The Freezout Lake Wildlife Management Area is divided into six (6) trapping units. Two trapping seasons are designated — fall (November 1 to December 31) and spring (January 1 to April 15). Unit Six is closed to trapping during the fall season. Trappers will be selected by a random drawing. Prior to the drawing, each trapping unit is assigned a number and is awarded to the trapper with the corresponding rank on the priority list. Applicants must submit their name, address, phone number, trapper's license number and indicate the season for which they wish to be considered by September 15 to:

Wildlife Biologist, Dept. of Fish, Wildlife and Parks,
Freezout Lake WMA, POB 488, Fairfield, MT 59436

Canyon Ferry Wildlife Management Area — The Canyon Ferry Wildlife Management Area is divided into two (2) trapping units. Trappers will be selected by a random drawing. The first trapper will be able to select a trapping unit. Each of the selected trappers shall be permitted to trap ten (10) beaver. Applicants should be aware that only limited populations of most furbearers exist on the Area and that most access is by foot. No trapping will be allowed on the Area until the end of the pheasant hunting season. Applicants must submit their name, address, phone number, and trapper's license number by September 15 to:

Tom Carlsen, Department of Fish, Wildlife and Parks,
Box 998, Townsend, MT 59644

SPECIAL REGULATIONS (cont.)

Upper Madison Beaver Management Area – Refer to Legal Description.

The upper Madison trapping area consists of seven (7) units for beaver and otter with quotas for each species. Trapping season is October 15 through April 30 by permit only. Trapping units will be allocated based upon random drawing from written trapper applications. Trappers may select a trapping area in the order their names are drawn. Each of the selected trappers shall be permitted to trap five (5), or ten (10) beaver depending on the trapping area assigned. The last trapper selected will not have a choice but will be assigned an area. Applicants must submit their name, address, phone number, and trapper's license number by September 15 to:

Kurt Alt, Department of Fish, Wildlife and Parks,
1400 S. 19th Avenue, Bozeman, MT 59715

Blackfoot-Clearwater Wildlife Management Area – The Blackfoot-Clearwater Area is divided into two (2) trapping units (Clearwater River and Cottonwood Creek), and trapping is permitted during two (2) periods (November 1 - January 31; February 1 - April 15), with one trapper per unit and time period (4 trappers total). Trappers will be selected by a random drawing. The first trapper will be asked to choose a unit and period, the second trapper drawn will be offered the remaining choices, and so on. Each of the selected trappers shall be permitted to trap one limit of furbearers, including ten (10) beaver. Applicants must submit their name, address, phone number, and trapper's license number by September 15 to:

Mike Thompson, Department of Fish, Wildlife and Parks,
3201 Spurgin Road, Missoula, MT 59801

Lake Helena Wildlife Management Area – The Lake Helena Wildlife Management Area consists of 1 trapping unit. A spring trapping season is designated: January 1 to April 15. No trapping will be allowed on the Area until after the waterfowl hunting season. One trapper will be permitted to trap furbearers and predators. The trapper will be selected by a random drawing. Applicants must submit their name, address, phone number, and trapper's license number by September 15 to:

Gayle Joslin, Department of Fish, Wildlife and Parks,
1420 East Sixth Avenue, Helena, MT 59620

CLOSED TO BEAVER/OTTER TRAPPING

Note – All areas closed to beaver trapping are also closed to otter trapping.

Beaverhead County – The entire Stone Creek, Trail Creek, Trapper Creek drainages and Canyon Creek upstream above the National Forest boundary.

Broadwater County – Those portions of Dry Creek, Confederate Gulch, White Gulch, Avalanche Gulch, Eagle Creek, Crow Creek and Jenkins Creek on public land.

Deer Lodge County – The entire Dry Cottonwood Creek drainage.

Gallatin County – That portion of the Gallatin River and all of its tributaries above the Gallatin River Bridge at the Squaw Creek Ranger Station.

Gallatin and Park Counties – That portion of the Yellowstone River and all of its tributaries inside the Gallatin National Forest boundary above the Yellowstone River Bridge on Interstate Highway 90 at Livingston.

Granite County – The entire Smart Creek, Wyman Creek, Swamp Gulch Creek, and Sand Basin Creek drainages.

CLOSED TO BEAVER/OTTER TRAPPING (cont.)

Lewis and Clark County – The Blackfoot River upstream from the mouth of Bartlett Creek including the entire Bartlett Creek drainage.

Lewis and Clark County and Cascade County – The portion of the county which is the Beartooth Wildlife Management Area.

Madison County – Ledford Creek and its tributaries above the mouth of Spring Creek. Robb Creek and its tributaries above the north boundary of the Robb-Ledford Wildlife Management Area.

Mineral County – The entire Cedar Creek, Big Creek and Flatrock Creek drainages.

Missoula and Mineral Counties – The entire Fish Creek drainage.

Missoula County – Nine Mile Creek drainage above Pine Creek.

Powell County – The entire Pikes Peak drainage.

Sweet Grass County – That portion of the East Boulder River and all its tributaries from the Gallatin National Forest boundary upstream to the headwaters of the East Boulder River.

Sweet Grass and Park Counties – That portion of the Main Boulder River and all its tributaries from the mouth of Falls Creek upstream to the headwaters of the Main Boulder.

Teton County – The entire drainages including all tributaries of the South, Middle, West, and North Forks of the Teton River downstream to the U.S. Forest Service boundary.

TURN IN POACHERS

with this information

- What, Where
- When, Who
- How

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(847-6668)**

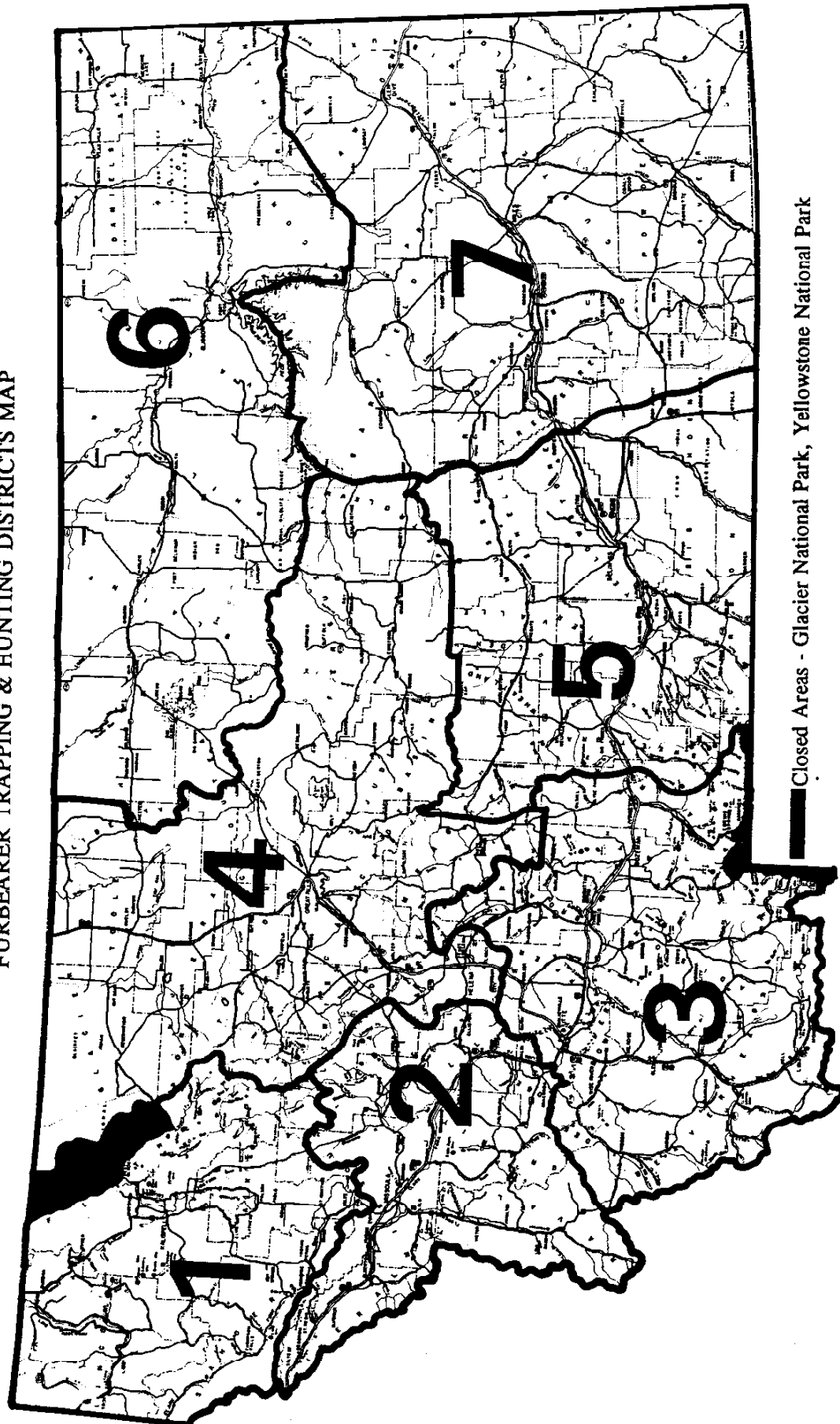
By order of the Montana Fish, Wildlife and Parks Commission, the seasons, limits and regulations listed herein shall govern the 1994 & 1995 trapping seasons. These regulations are valid July 1, 1994, through June 30, 1996. The trapping regulations were adopted by the Fish, Wildlife and Parks Commission on August 5, 1994. Montana Fish, Wildlife and Parks Commission: Patrick J. Graham, Secretary.



**Montana Department of
Fish, Wildlife & Parks**



FURBEARER TRAPPING & HUNTING DISTRICTS MAP



INVESTIGATION OF FURBEARER OCCURRENCE WITH SPECIAL REFERENCE TO SWIFT FOX AND PRELIMINARY MODELLING OF POSSIBLE SWIFT FOX POPULATION DYNAMICS IN NORTH DAKOTA-1994-1995

STEPHEN H. ALLEN, North Dakota Game and Fish Department, 100 N. Bismarck Expressway, Bismarck, ND 58501. (701-328-6300; fax 701-328-6352; e-mail: cc mail.sallen@ranch.state.nd.us)

ABSTRACT

Randomly selected quarter-sections have been surveyed (n=65) for furbearer occurrence by identifying tracks to species. No swift fox have been detected. Population modelling indicates that possibly 40% annual survival rates may be needed for a swift fox population to remain stable. Differential reporting rates for red fox and coyote harvests and confirmed swift fox observations indicate swift fox exist at extremely low densities if at all in North Dakota.

INTRODUCTION

Interest in swift fox (*Vulpes velox*) has increased greatly in recent years. Swift fox were common in North Dakota during pre-settlement times (Bailey 1926, Thwaites 1953); however, the species became very rare about 1880-1900 (Bailey 1926). The current legal status of swift fox in North Dakota is that they are a furbearer and the harvest season is closed (Appendix 1). Swift fox are classified as a candidate for listing as a federally listed endangered or threatened species by the U. S. Fish and Wildlife Service (category 2) indicating populations may be in trouble and further research is warranted. Swift fox are known to be very rare in North Dakota; however, no data are available with which to make inference concerning the occurrence of the species. Initially, Sioux, Grant, Slope, Bowman counties in southwestern North Dakota and Ransom county in southeastern North Dakota were selected for study, because of occasional reports of possible swift fox in these areas. In addition, possible population dynamics are being evaluated through computer population modelling utilizing both deterministic and stochastic models. The emphasis of the modelling is to ultimately determine the required size of a swift fox transplant into North Dakota that will increase to a genetically effective population size of 500 animals within 5 years after the transplant. The ultimate objective of a successful swift fox transplant in North Dakota is the addition of a native species that would eventually become available for fur harvesting. The objective of this report is to present the results of a survey to determine relative occurrence of all furbearer species in this area with special reference to swift fox and to report preliminary results of population modelling of possible population dynamics.

STUDY AREA AND METHODS

Three widely spaced areas have been surveyed for relative occurrence of furbearers with emphasis on swift fox. The area in southwestern North Dakota is primarily semi-arid prairie grassland with some intermixed cropland and hayland. Topography is generally rolling grassland to rough broken badlands; native hardwoods trees and shrubs occur in the many of the deeper coulees. All of Sioux county in south-central North Dakota is part of the Standing Rock Indian Reservation. Cover type in Sioux, Morton and Grant counties is primarily rolling grassland with some rough badlands, and many big coulees with some native hardwoods and shrubs. Permission was obtained from the tribal council to conduct the survey in Sioux County. The area in southeastern North Dakota is gently rolling topography; it is heavily farmed with small grains as the primary crop. Climate in North Dakota is typical of sub-arctic continental interiors with hot summers and cold winters.

Track surveys were conducted to determine relative occurrence of furbearers in Sioux and southern Grant counties from 11 May 94 through 3 June 94. The survey was modified from one developed by Sargeant et al. (1993). Timing of the survey minimizes errors in correctly identifying species caused by movement of young, especially in the canids.

Twenty sections were selected randomly for study in 1994; within each section one quarter-section study area was selected at the site which had the best potential for identifying furbearer tracks. Some randomly selected sections had to be relocated to improve field logistics due to remoteness and inaccessibility of some of the original selections or proximity to human habitations. All study areas were surveyed no sooner than 48 hours after a rain. The search pattern consisted of visiting as many locations on each study area as possible on foot within 30 minutes that had potential to reveal furbearer tracks. We conducted similar track surveys of 30 quarter sections in Slope and Bowman counties in April, 1995 and 15 quarter-sections in Ransom county in May, 1995.

Data collected for each study area consisted of relative abundance of tracks by species (none, scarce, common, abundant), predominant cover type (pasture, hayland, cropland, marsh, idle), relative amount of available track sites (many, moderate, few, almost none), relative soil condition for holding tracks (excellent, good, fair, poor), and the track accumulation period (1 day, 2-3 days, 4-6 days, 7 or more days). Coyote and red fox tracks were distinguished based on size (Allen, unpubl. data). Swift fox tracks are easily distinguished from other canids because they average about 10 mm shorter than the smallest red fox tracks (Orloff et al. 1993). Data analysis consisted of the examining the number of study areas with furbearer track occurrence by species.

Population modelling of possible population dynamics was conducted using POP-2 population model (deterministic) and PD-45 (stochastic and deterministic) as developed by Grier (1980).

RESULTS

Densities of furbearer species were not determined in this study. Relative occurrence of furbearer species identified on the 20 study areas in 1994 consisted of coyotes (*Canis latrans*-12 areas), red fox (*Vulpes vulpes*-5 areas), raccoon (*Procyon lotor*-4 areas) and skunk (*Mephitis mephitis*-1 area). No swift fox tracks were identified on any of the 20 study areas. Visual observation of 1 coyote was made on each of 2 study areas; no other furbearers were observed in transit to or between study areas. All 5 of the study areas with red fox tracks also contained coyote tracks; whereas, 2 of 4 study areas with raccoon tracks contained coyote tracks. Sixteen of the 20 study areas contained tracks of at least 1 furbearer species. The 4 study areas without identifiable tracks all had few or almost no available track sites, fair or poor soil conditions to identify tracks, or both. Only 3 of the study areas had good or excellent soil conditions, and moderate or many available track sites.

Data for 1995 are presented in table 1. No swift fox tracks were identified on any of the 45 study areas. Visual observations of 2 red fox, 1 badger (*Taxidea taxus*, and 1 skunk were made on the Slope and Bowman county study areas; no visual observations of furbearers were made on the Ransom county study areas. The Ransom county study area was selected, because a swift fox was accidentally captured by a red fox trapper during November, 1994.

Other relative occurrence data for canids are also available in North Dakota. Since 1970 we have obtained 4 confirmed observations of swift fox in North Dakota. During that same time period there have been 676,300 red fox and 191,200 coyotes sold to North Dakota furbuyers.

Preliminary information obtained from population modelling indicates survival rates of approximately 40% may be needed for stability in swift fox populations. Further, previous work with red fox and coyotes in North Dakota indicates that changes in population size are more significantly affected by changes in survival rates than changes in reproductive performance. At present, this also appears to be the case in swift fox.

Funding for swift fox work in North Dakota is state and federal aid to fish and wildlife management (Pittman-Robertson). Total estimated costs of swift fox work in North Dakota for calendar year 1995 are \$13,126.28.

DISCUSSION

Interspecific competition has been well documented between wolves (*Canis lupus*) and coyotes (Carbyn 1982) and between coyotes and red foxes (Sargeant et al. 1987) in the northern plains. Interspecific competition from other canids (especially coyotes) may be a significant limiting factor in currently existing swift fox populations in Kansas (L. Fox, 1994 Midwest Furbearer Workshop), and in efforts at reintroduction of swift fox in Saskatchewan (L. Carbyn, 1994 Midwest Furbearer Workshop). Ralls and White (1995) noted that although coyote predation on kit fox in California can be severe, they found indications that red fox predation on kit fox may be catastrophic to the population. Data collected in this study indicate that most all quarter-section study areas randomly selected in North Dakota probably have red fox or coyotes or both species present. In addition, track surveys should represent a minimum distribution, because some quarter-sections with no canid tracks observed likely had canids present. Conditions for observing tracks in North Dakota are often far from perfect; however, a few good sites in most quarter sections are all that is often needed to identify one or more species of furbearer present. Considering the hypothesis the observations of Ralls and White (1995) suggest and the density and distribution of red fox and coyotes in North Dakota the potential for viable swift fox populations may be quite remote. This hypothesis certainly warrants further investigation.

Historically, interspecific competition may not have been as severe on swift fox prior to settlement in the region. At that time wolves were the dominant canid, and coyotes were probably very rare (Johnson and Sargeant 1977). With removal of wolves during and after settlement the canid composition changed and coyotes became more abundant, and conditions for swift fox survival may have deteriorated dramatically. If this hypothesis is correct, the probability for existence of viable natural or reintroduced swift fox populations in this area is extremely limited without major alterations to the present canid community. Alteration of the current canid community to include wolves is not a viable management option in an agricultural environment due to conflicts with livestock. Alteration of the canid community to physically remove the coyotes or red fox is not a viable management option due to prohibitive costs of neutralizing canid dispersal into the control area (Allen, unpubl. data).

Numbers of red fox and coyotes sold to North Dakota furbuyers is the minimum number of these species taken, annually. Not all animals are sold after they are taken, and not all pelts sold are sold to North Dakota furbuyers. Given the magnitude of differences of red fox and coyotes taken as compared to confirmed swift fox observations, we again question if swift fox have very much potential for survival in North Dakota considering the number and distribution of these other canids at present.

The population modelling effort indicates survival rates > 40% may be needed for a transplanted group of swift foxes to increase to a genetically effective long-term population size of 500 animals (Brussard 1985). This may be almost impossible considering the hypothesis indicated by the interspecific competition observations of Ralls and White (1995) and the size and distribution of the red fox population in North Dakota. Nevertheless, for our population modelling efforts more refinement of input data are needed. For

example, litter sizes in swift fox are currently being determined by counts of placental scars and observations of pup numbers at dens. In North Dakota red fox we found that pup observations at dens typically underestimate actual litter sizes (Allen, unpubl. data), and counts of placental scars often overestimate actual litter sizes (Allen 1983). Thus, some obvious needs for representative population models include estimates of litter size determined from pregnant females by female age class, annual survival rates by age class and sex preferably determined from radio-collared animals, and information on social behavior, territoriality to determine if family territories exist as in kit fox (Ralls and White 1995) and other canids (Sargeant et al. 1987, Allen et al. 1987).

Costs incurred by North Dakota Game and Fish to gather data on swift fox are not prohibitive at this point. However, limitations may develop in the man-hours of Game and Fish Department time that will be expended on a species such as swift fox that provides no man-hours of harvest potential or furs for fur harvesters.

The present study also illustrates the paucity of data that is obtained from diurnal observations of live furbearers. Few are seen because of the secretive behavior of these species; however, most randomly selected quarter-section study areas with favorable conditions for locating tracks had furbearer tracks present indicating occurrence of one or more species. In the case of swift fox; however, a visual observation would be required in addition to a track observation to confirm their occurrence, and to eliminate any possible error caused by misidentification of a red fox or coyote pup track. This experimental investigation indicates that various species of furbearers occur on almost all quarter-section study areas, and occurrence of coyotes or red fox or both species is likely on many areas. Other species such as swift fox may be present, but they appear to exist at extremely low levels.

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Table 1. Percent occurrence of furbearer tracks by species and county on randomly selected quarter-section study sites in North Dakota - 1995

Species and relative number of tracks		County				
		<u>Ransom (n=15)</u>	<u>Morton (n=3)</u>	<u>Grant (n=2)</u>	<u>Slope (n=11)</u>	<u>Bowman (n=19)</u>
<u>Red Fox</u>						
0 (none)		6.7	66.7	50.0	72.7	52.6
1 (few)		13.3	33.3	50.0	18.2	31.6
2 (moderate)		20.0			9.1	
3 (many)		60.0				15.8
<u>Coyote</u>						
0		73.3	33.3		45.5	73.7
1		20.0	33.3	100.0	27.3	21.1
2		6.7				
3						
<u>Skunk</u>						
0		13.3	100.0	100.0	90.9	94.7
1		60.0			9.1	5.3
2		6.7				
3		20.0				

Table 1.(Cont)

Species and relative number of tracks	County			
	<u>Ransom (n=15)</u>	<u>Morton (n=3)</u>	<u>Grant (n=2)</u>	<u>Slope (n=11)</u>
<u>Badger</u>				<u>Bowman (n=19)</u>
0	100.0	100.0	100.0	100.0
1				89.5
2				10.5
3				
<u>Raccoon</u>				
0	13.3	66.7	100.0	72.7
1	20.0	33.3		27.3
2	33.3			
3	33.3			
<u>Coverttype</u>				
pasture	13.3	66.7	50.0	100.0
hayland		33.3	50.0	
cropland	86.7			
marsh				
idle				

Table 1.(Cont)

Species and relative number of tracks	County			
	<u>Ransom (n=15)</u>	<u>Morton (n=3)</u>	<u>Grant (n=2)</u>	<u>Slope (n=11)</u>
				<u>Bowman (n=19)</u>
<u>Soil Conditions to observe tracks</u>				
excellent	73.3			9.1
good		66.7		10.5
fair	13.3		50.0	18.2
poor	13.3	33.3	50.0	36.4
				57.9
				15.8
<u>Available track sites</u>				
many	20.0		100.0	9.1
moderate	33.3			31.6
few	26.7	66.7		27.3
almost none	20.0	33.3		45.5
				36.8
				18.2

a - number of quarter-section study sites surveyed in 1995

NORTH DAKOTA 1995-96 SMALL GAME AND FURBEARER GUIDE



EFFECTIVE AUGUST 15, 1995 - AUGUST 31, 1996
North Dakota Game and Fish Department
100 North Bismarck Expressway
Bismarck, North Dakota 58501-5095
(701) 328-6300



LICENSES. Each hunting license is in the form of a stamp which must be affixed to the back of the licensee's FISHING, HUNTING AND FURBEARER CERTIFICATE. All stamps must be validated by his/her signature written across the face in ink.

Pheasant, partridge, grouse, duck, goose, swan, merganser, sandhill crane, coot, crow, snipe, dove and squirrel hunters must possess general game and habitat stamps and small game stamps (exception: residents under 16 years of age do not need a small game stamp). In addition, all duck, goose, swan, and merganser hunters 16 years of age or older must possess Federal migratory bird hunting stamps, all crane and swan hunters must possess special permits, and all nonresident duck, goose, swan, merganser, and coot hunters must possess Nonresident Waterfowl Licenses.

Except for residents under 16 years of age, to hunt or trap furbearers, a Furbearer stamp is required. Nonresidents may not take furbearers, except that they may hunt fox and coyote if they possess a Furbearer and Nongame stamp. (Exception: Residents of a state that allows North Dakota residents to trap within that state may purchase a nonresident reciprocal trapping license to trap in this state. Nonresidents having this license may not take bobcats).

Hunters and trappers are required to purchase licenses, except any resident, or member of his family permanently residing with him, may hunt small game, trap or snare during the open season without a license upon land owned or leased by him, but otherwise is governed by seasons, limits, and all other regulations.

A resident does not need a license to take unprotected species of wildlife. A nonresident hunting only unprotected species of wildlife needs only a Nongame stamp.

A combination Resident Sportsmens License is available which consists of Fishing, Small Game, General Game and Habitat, and Furbearer licenses.

Nonresident youth hunting licenses. A nonresident under age sixteen may purchase a North Dakota resident small game hunting license (\$6.00) and may hunt small game and waterfowl except swans and wild turkeys; provided, that the nonresident's state, or province or territory of Canada, of residence provides a reciprocal licensing agreement for North Dakota residents who are also under age sixteen. To be eligible, a nonresident youth may not have turned sixteen before September first of the year for which the license is issued and must possess a certificate of completion for a certified hunter education course. The nonresident youth may only hunt under the supervision of an adult family member or legal guardian who is licensed to hunt small game or waterfowl in this state and is subject to the same regulations as that youth's adult family member or legal guardian.

MIGRATORY BIRD HUNTING STAMP. No persons 16 years of age or older, including landowners, shall hunt, kill, or take ducks, geese, swans or mergansers without having in his or her possession a Federal migratory bird hunting and conservation stamp (duck stamp) for the season and validated by his or her signature written across the face of it in ink.

HUNTER EDUCATION REQUIREMENT. Persons born after 1961 must complete a certified Hunter Education course, and present the certificate earned to the license vendor to purchase a hunting license. Certificates from other states or Canada are valid. Exemptions: Persons who hunt only on land they own or operate; persons under 12 years of age (those under 12 may hunt if they have appropriate license and are accompanied by parent or guardian).

DEFINITION OF TERMS.

"Game" shall include any of those species of small game, or furbearers as defined in Section 20.1-01-02 of the North Dakota Century Code.

"Upland Game" shall include sharptail and sage grouse, Hungarian partridge, pheasants and tree squirrels.

"Waterfowl" shall include ducks, geese, swans, mergansers, and coots.

"Daily Limit" means the maximum number of the particular game referred to that a hunter legally licensed by this state may take or kill for that species during a single hunting day.

"Possession Limit" means the maximum number of particular game referred to that a hunter, legally licensed by this state, may have in his/her actual possession during any phase of any single hunting trip, venture, or expedition of more than one day. No more than a daily limit may be taken during any one day.

Game taken on any North Dakota Indian reservation shall be included in the daily bag and possession limits.

"Possession of Shot Other Than Non-Toxic Shot" means in the gun, or in the pockets, or within reach while in the process of hunting ducks, geese, swan, mergansers, sandhill crane, snipe and coot.

RAP Program (REPORT ALL POACHING). This program provides people the opportunity to report wildlife violations, remain anonymous if they prefer and to receive monetary rewards for convictions based on their information. Anonymous callers will be given a special code number and are not required to give their name. Rewards range from \$50 to several hundred dollars depending upon the nature and seriousness of the crime. Call 1-800-472-2121. The reward fund is supported by private donations. If you wish to donate to the RAP program, tax deductible contributions can be sent to R.A.P., Box 601, Casselton, N.D. 58012.

IDENTIFICATION. One fully feathered wing or the fully feathered head of all waterfowl, dove, snipe, or crane and one leg and foot or the fully feathered head or wing of pheasant, Hungarian partridge, and all grouse shall remain attached to such game during the transportation or shipment to final place of storage.

TRANSPORTING AND PROCESSING. Each license holder must accompany his/her own game in transportation, and may not transport game for another, except when such game is shipped by public carrier in receipt of proper bill of lading.

Common carriers and game processors may possess any person's legally taken possession limit of game. Each piece of game must be tagged with the owner's name, address and small game license number. Only common carriers in possession of a bill of lading may transport game other than their own. A nonresident licensee may arrange shipment of or personally transport his/her game from this state. No resident shall so ship or transport game from this state unless he/she (1) obtains a permit from the game and fish director or (2) ships or transports only hides or furs legally taken and possessed for purposes of sale or tanning. With the exception of licensed fur buyers complying with Section 20.1-03-23 of the North Dakota Century Code, any resident so shipping or transporting such hides or furs shall tag each hide or fur with the name of the person having taken it and the person's furbearer license number.

Nonresidents may transport or ship from the state a possession limit of upland game. No one may possess, transport or ship at any one time more than a possession limit of waterfowl, upland game, snipe, doves, or sandhill cranes. No person shall ship migratory game birds unless the package is marked on the outside with: (1) the name and address of the person sending the birds, (2) the name and address of the person to whom the birds are being sent, and (3) the number of each species contained in the package. No person shall put or leave any game birds at any place unless the birds are tagged by the hunter with the following information: the hunter's signature and address, date taken, number and species of such birds, and small game license number. The above tag is required if the birds have been left by the hunter for cleaning, storage (including temporary storage), shipment, or taxidermy services.

USE OF VEHICLES, BOATS, AND AIRCRAFT. Aircraft, snowmobiles, and motor vehicles may not be used to kill, chase, or harass wild birds or animals. In addition, aircraft may not be used to spot game and snowmobiles may not be used to flush wildlife.

It is illegal to carry a firearm in or on a motor vehicle with a shell in the chamber. For a muzzleloading gun this means with a percussion cap on the nipple or powder in the flash pan. The entire cylinder of a revolver is considered as the chamber.

It is illegal to drive motor vehicles off established roads and trails unless hunting waterfowl or cranes. Established roads and trails do not include temporary trails across cultivated land used for agricultural purposes.

Mallard Island and deTrobriand Island are closed to the use of all motorized vehicles and aircraft. On all other wildlife management areas, owned or managed by the N.D. Game and Fish Department, the use of all motorized vehicles is restricted to those constructed roads, well worn trails, and parking areas normally used by passenger cars. Motor vehicle use on wildlife management areas is further restricted or prohibited where such restrictions or prohibitions are posted.

All firearms must be unloaded and encased while traveling within the boundaries of a National Park.

Motorboats are legal in going to and from shooting grounds. It is legal to shoot from a boat which is fastened within or tied immediately alongside a stationary blind. Blinds may be of natural or artificial material. It is unlawful to shoot from a sunken device or any floating vessel on open water or to use or cause to be used any floating battery, electric, steam, gasoline, or other powered vessel in an attempt to take waterfowl. A motorboat, sailboat, or other craft may be used to pick up dead or injured birds.

Each watercraft must be provided with U.S. Coast Guard approved life preservers for all occupants.

LICENSES BY PHONE: QUICK—CONVENIENT—EASY

Now you can also purchase your licenses over the telephone - 24 hours a day. Call tollfree 1-800-406-6409. Visa, Discover, and MasterCard accepted. (In addition to the license fee a service charge will be added. Service charge will vary depending on amount of transaction. **Telephone license sales allowed for all non-lottery issued licenses.**)



ROAD RIGHT OF WAYS — Do not hunt on road right of ways unless you are certain that they are open to public use. Most road right of ways are under the control of the adjacent landowner and are closed to hunting when the adjacent land is posted closed to hunting.

CROWS

Open Area:		Statewide
Fall Season	Opens:	Aug. 19
	Closes:	Oct. 29
Spring Season	Opens:	Mar. 16
	Closes:	Apr. 28
Daily Limit:		There is no
Possession Limit:		limit on Crows
Shooting Hours:		1/2 hour before sunrise to sunset

In addition to the crow season, crows may be taken when committing or about to commit depredations as specified in Federal law (50CFR21.43).

MOURNING DOVES

Open Area:		Statewide
Opens:		Sept. 1
Closes:		Oct. 30
Daily Limit:		15
Possession Limit:		30
Shooting Hours:		1/2 hour before sunrise to sunset

It is illegal to hunt doves or other birds resting on utility lines or fixtures adjacent to such lines.

SANDHILL CRANES

Open Area:		That portion of North Dakota west of U.S. Highway 281
Opens:		Sept. 9
Closes:		Nov. 5
Daily Limit:		3
Possession Limit:		6
Shooting Hours:		1 p.m. CDT Sept. 9 thru Oct. 28 1/2 hour before sunrise to:
		2 p.m. CST Oct. 29 thru Nov. 5

In addition to other licenses required, sandhill crane hunters must possess a \$5.00 sandhill crane hunting permit available from the North Dakota Game and Fish Department's Bismarck office.

It is unlawful to shoot from open water or from a boat or other floating vessel in open water while hunting sandhill cranes.

SNIFE

Open Area:		Statewide
Opens:		Sept. 9
Closes:		Nov. 26
Daily Limit:		8
Possession Limit:		16
Shooting Hours:		1/2 hour before sunrise to sunset

HUNGARIAN PARTRIDGE

Open Area:		Statewide
Opens:		Sept. 9
Closes:		Jan. 7
Daily Limit:		4
Possession Limit:		12
Shooting Hours:		1/2 hour before sunrise to sunset

SHARP-TAILED GROUSE

Opens:		Sept. 9
Closes:		Jan. 7
Daily Limit:		3
Possession Limit:		12
Shooting Hours:		1/2 hour before sunrise to sunset

Open Area — Statewide except for: the area in southeastern North Dakota east of N.D. No. 32 and south of the Sheyenne River and an area in Grand Forks County bordered on the east by the Red River, the south by US Highway 2, the west by ND Highway 18 and the north by the Walsh and Grand Forks County line. Both areas are closed to sharp-tailed grouse hunting.

RUFFED GROUSE

Opens:		Sept. 9
Closes:		Jan. 7
Daily Limit:		3
Possession Limit:		12
Shooting Hours:		1/2 hour before sunrise to sunset

Open Area — Bottineau, Rolette, Cavalier, Pembina, Walsh, and Dunn counties in North Dakota. Also that portion of the J. Clark Salyer National Wildlife Refuge in McHenry County lying south of the Upham-Willow City Road is open to ruffed grouse hunting.

SAGE GROUSE

Opens:		Sept. 11
Closes:		Sept. 13
Daily Limit:		1
Possession Limit:		1
Shooting Hours:		1/2 hour before sunrise to sunset

Open Area — Area south of Interstate 94 and west of U.S. Highway 85 in southwestern North Dakota.

TREE SQUIRRELS

Open Area:		Statewide
Opens:		Sept. 9
Closes:		Jan. 7
Daily Limit:		4
Possession Limit:		12
Shooting Hours:		1/2 hour before sunrise to sunset

Tree squirrels may be taken only with firearms loaded with shot, rimfire and muzzleloading firearms, or with bow and arrows legal for taking upland game.

COCK PHEASANT

Open Area:	*Early Season	**Late Season
Opens:	Oct. 14	Oct. 28
Closes:	Jan. 7	Jan. 7
Daily Limit:	3	
Possession Limit:	12	
Shooting Hours:	1/2 hour before sunrise to sunset	

MALE PHEASANTS ONLY MAY BE TAKEN.

***Early Season** is statewide except for **Late Season** area.

****Late Season** includes area in Williams and McKenzie counties starting where BN Railroad enters North Dakota, then east on the railroad tracks to the west boundary of the Trenton Wildlife Management Area (southwest of Trenton) then south and east on the boundary of the Trenton WMA to the Missouri River, then directly across the river, then west to the Yellowstone River, then south and west on the Yellowstone River to the Montana border, then north to the point of origin.

SPECIAL EXTENDED FALCONRY SEASON. Licensed falconers possessing the appropriate licenses may hunt resident game species from August 15, 1995, through March 31, 1996 and certain migratory game species from September 1, 1995 through December 31, 1995. Contact the Department for details.

NON-TOXIC (STEEL) SHOT REGULATIONS

Possession or use of shot other than federally approved non-toxic shot is prohibited while hunting ducks, geese, sandhill cranes, tundra swans, snipe, mergansers and coot statewide. In addition, non-toxic shot is required for upland game bird hunting on all national wildlife refuges. Contact refuge headquarters for details. **Notice: Beginning in the fall of 1996 - non-toxic shot will be required on all Fish and Wildlife Service lands. This will include all Waterfowl Production Areas and Federal Refuges open to hunting.**

For additional information on non-toxic shot, contact the Department's Bismarck office.

WATERFOWL SEASONS & REST AREAS

Final federal regulations regarding duck and goose seasons were not available before this guide was printed. A separate waterfowl hunting guide will be distributed in September 1995.

Waterfowl rest areas are located throughout the state and are in effect Sept. 25 through the close of the goose hunting season. Most rest areas are closed to small game hunting (includes waterfowl), others are closed to all hunting, and some are closed to just waterfowl hunting. Some areas are also closed to fishing. Refer to the waterfowl hunting guide for a listing of these areas. Signs are posted on the areas and they list regulations for the particular area.

FURBEARERS

Snaring

- Use of snares is permitted on state wildlife management areas and federal waterfowl production areas from January 8, 1996 through March 17, 1996.
- A metal or plastic tag must be attached to each snare. This tag must bear the trapper's name, address and telephone number.
- Use of relaxing snares is permitted. One stop must be affixed to each snare on land that will prevent the snare from opening to a diameter greater than 12 inches.
- Snares cannot be placed or set in the field prior to the opening date or remain set or placed in the field after the closing date of the snaring season for respective species.
- All snares must be affixed to an immovable object solidly attached to the ground. The use of drags is prohibited.
- Snares cannot be set so the bottom of the loop is higher than 12 inches off the ground; or when the ground is snow covered, more than 12 inches above the bottom of a man's footprint in the snow beneath the snare with the full body weight on the foot.
- Galvanized or stainless steel cable snares only of 1/16 inch diameter or larger (no single strand snares are allowed) with any snare lock that breaks or disassembles at an average of 350 lb. pull or less are legal. The following snare locks have been tested and found to meet this requirement: 1) Hopkin S-hook, 2) Pedersen fastener pin, 3) Lucero hand crimped wire pin, 4) Lucero machine crimped wire pin, 5) Gregorson leg-snare, 6) Gregorson neck snare, 7) BMI shear pin cam-lock, 8) Kelly (Amberg), 9) Olson coil, 10) Snare shop N.D. lock and stop system, 11) Grawes 20 ga. bullet lock snare, 12) Beach snare.

Prohibited trap sets

- Conibear type traps with an inside jaw spread greater than 8 inches and water sets with any other trap are prohibited from September 1 through November 3, 1995 — exception: unless trap is set in 4 or more inches of water. From November 4 through December 31, 1995, Conibear type traps with an inside jaw spread greater than 8 inches shall be prohibited unless at least 4 inches of the jaws are submerged in water. From January 1, 1996 through August 31, 1996, there shall be no restriction on the placement of these traps.

GENERAL GUIDELINES

- It is unlawful to trap or snare on private land without written permission of the owner or operator. The owner or operator may determine the length of time permission is granted.
- It is unlawful for nonresidents to take furbearers other than fox and coyote which they may hunt only. (Exception: See license section for special license available).
- The season on lynx (*Lynx canadensis*), wolves (*Canis lupus*), swift fox (*Vulpes velox*), black bear (*Ursus americanus*), wolverines (*Gulo gulo*), martens (*Martes americana*), otters (*Lutra canadensis*), fishers (*Martes pennanti*), and mountain lion (*Felis concolor*), shall remain closed.
- Aircraft may not be used to take coyote, fox, or other furbearers, without a special permit.
- Furbearers may be taken with firearms, archery equipment (including cross bows), dogs, traps, and snares except mink, muskrat, and weasel may be taken with traps and snares only.
- The opening hour on the first day of all furbearer seasons is 1/2 hour before sunrise. After the first day of the season, trapping or snaring is legal at any hour. Hunting hours are from 1/2 hour before sunrise to 1/2 hour after sunset except for fox and coyote as listed at right and for raccoon which may be taken on foot at any hour with the aid of not more than a 2-cell flashlight with an aggregate

of 4 volts. A red or amber filter must be placed over the light except when taking a raccoon treed or at bay. Legal weapons for flashlight hunting of raccoon are rifles or handguns firing a rimfire cartridge no larger than .22 caliber long rifle or shotgun no larger than a .410 gauge. Rifled slugs are not legal.

- It is unlawful to drive off established trails or roads during the deer gun season while attempting to take furbearers with firearms, archery equipment and dogs.
- It is unlawful to place traps or snares within 25 feet of any sight exposed bait. A sight exposed bait is defined as any bait, weighing in excess of one pound, composed of animal flesh, fur, hide, entrails, or feathers placed in such a manner that it can be seen by any soaring hawk, owl, or eagle.
- It is recommended that all traps and snares be visually inspected and all captured animals removed at no greater than 48 hour intervals.
- No live furbearing animal may be taken from the wild or possessed alive by nonresidents. Residents must first have a valid non-traditional livestock license for that purpose issued by the Board of Animal Health.

BEAVER HUNTING, TRAPPING, AND UNDERWATER SNARING

Opens: Sept. 1 — Closes: Aug. 31

BEAVER SNARING ON LAND

Opens: Dec. 1 — Closes: Mar. 17

See also experimental season below

In addition, beaver may be snared on land from March 18, 1996 through April 30, 1996. During this **experimental beaver snaring season** on land, snares must be within 50 feet of water; they must be no greater than 4 inches off the ground and they must have a stop restricting loop size to 12 or less inches in diameter.

Beaver dams may be dismantled when their presence causes property damage.

MINK AND WEASEL TRAPPING

Opens: Nov. 4 — Closes: Jan. 7

MINK AND WEASEL SNARING

Opens: Dec. 1 — Closes: Jan. 7

MUSKRAT TRAPPING

Opens: Nov. 4 — Closes: Mar. 17

MUSKRAT SNARING

Opens: Dec. 1 — Closes: Mar. 17

Muskrat huts may be opened for insertion of traps or snares; however, the huts must be restored to their approximate original condition to prevent freeze-up.

BOBCAT - HUNTING, TRAPPING OR SNARING

Opens: Dec. 16 — Closes: Feb. 25

Open only in the area south and west of the Missouri River.

The pelt and carcass of each bobcat **must be** presented to Game and Fish Department personnel for inspection and tagging prior to sale or transfer of possession, but no later than 14 days after the close of the season. Absolutely no bobcat pelt will be tagged until the animal is skinned and presented with the intact carcass. The carcass then becomes the property of the Department. No fur dealer shall possess or purchase an untagged bobcat.

RED FOX, GRAY FOX, COYOTE, RACCOON AND BADGER HUNTING OR TRAPPING

Opens: Sept. 1 — Closes: Aug. 31

In addition, red fox, gray fox, and coyote may be hunted at any hour, from December 1, 1995, through March 17, 1996. Any hunter who engages in the hunting of red fox, gray fox, or coyote during the time from 1/2 hour after sunset to 1/2 hour before sunrise, must hunt exclusively on foot and use a predator call. The use of a spotlight or any other artificial light is prohibited.

RED FOX, GRAY FOX, COYOTE, RACCOON AND BADGER SNARING

Opens: Dec. 1 — Closes: Mar. 17

POSTING AND TRESPASS. It is illegal to hunt on posted land without permission. Upon conviction for a violation of this law, the court shall suspend the defendant's hunting, fishing, and trapping privileges for a period of at least one year. Only the owner or tenant may post land. Signs must give the name of the person posting the land and be placed not over 880 yards (one-half mile) apart around the land. Where the land is entirely enclosed by a fence, posting of signs at all gates is sufficient. It is illegal to deface or destroy posting signs.

Any person may enter upon legally posted land (without a weapon) to recover game shot or killed on land where he/she had a lawful right to hunt.

It is illegal to hunt in unharvested cereal crops and sunflowers without the owner's consent. Such crops include alfalfa, clover, and other grasses grown for seed.

It is illegal to hunt upon the premises of another within 440 yards of any occupied building without the consent of the person occupying the building. Note: This restriction is not meant to prohibit persons from hunting upon their own land.

It is unlawful to trap or snare on private land without written permission of the owner or operator.

Failure to close gates upon entry or exit is illegal.

LEGAL WEAPONS AND AMMUNITION. Game Birds and Waterfowl

— Only firearms loaded with shot no smaller than .410 caliber or larger than 10 gauge and capable of holding no more than three shells, legal archery equipment, and raptors may be used. Pistols may not be used to take migratory game birds. Non-toxic shot is required for some species. See non-toxic shot regulations described in this guide. Legal archery equipment consists of a bow pulled and released by hand and capable of casting a hunting arrow a distance of 130 yards. Arrows must be at least 24 inches long and have at least 2 untrimmed or 5 trimmed feathers. Exploding points are prohibited. Electronic range finding devices, electronic sight devices, and stationary lighted sight pins cannot be possessed while hunting. Raptors may be used only by those possessing a falconry permit.

"Paraplegics" and/or those having lost the use of one or both arms, having a permit from the game and fish director to hunt with a crossbow, may use such a weapon during the small game season. Crossbow arrows used for small game must have at least 2 untrimmed or not less than 5 trimmed feathers. Arrow length shall not apply to crossbows.

OTHER RESTRICTIONS. Persons under 15 years of age afield with firearms must be accompanied by parent, guardian, or adult authorized by parent or guardian.

It is illegal to go afield with a firearm or archery equipment while intoxicated.

It is illegal to use live birds as decoys.

Hunters may retrieve game that has fallen into a state wildlife refuge if they leave their firearms outside the boundary. They may not retrieve game that has fallen into a Federal Wildlife Refuge unless there has been a retrieving zone designated by the refuge manager.

It is unlawful to shoot harmless birds. All hawks, owls, and eagles are protected by state and federal law.

WANTON WASTE OF MIGRATORY AND UPLAND GAME BIRDS.

No person shall kill or cripple any migratory or upland game birds without making a reasonable effort to retrieve the bird, and retain it in his/her actual custody.

FEDERAL REFUGES. Contact refuge headquarters for regulations.

CLOSED OR RESTRICTED AREAS. Wildlife management areas so posted, refuges, sanctuaries, national parks, and historic sites shall be closed to the hunting and furtaking of all species. (Exception: small game hunting and furtaking shall be permitted at times and on those areas of Federally owned refuges designated by the refuge manager) A permit from the refuge manager is required for those wishing to trap on Federal refuges.

A permit from the game and fish director is required to take furbearers on those state wildlife management areas and state easement refuges posted closed to hunting. National parks and historic sites are closed to trapping. The Minot and Grand Forks air bases are closed to hunting. Carrying or possession of firearms on wildlife management areas so posted shall be prohibited from May 1 through Sept. 1 or date posted on the signs.

State school land is open to public access including hunting unless posted with State Land Department signs. Vehicles are not permitted on state school lands. Contact the State Land Department for additional information regarding state school lands.

State law allows the Governor to close or postpone a hunting season upon reasonable notice through the media if climatic conditions create a fire hazard.

Indian Reservations—Contact reservation tribal offices for more information.

• **Fort Berthold.** Department of Natural Resources, HC 3-Box 2, New Town, ND 58763, (701) 627-3627.

• **Standing Rock.** Game and Fish Department, Box D, Fort Yates, ND 58538, (701) 854-7236.

• **Turtle Mountain.** Department of Natural Resources, Box 570, Belcourt, ND 58316, (701) 477-6481.

SUMMARY OF FEDERAL REGULATIONS

In addition to State Regulations, these Federal rules apply to the taking, possession, transportation, and storage of migratory game birds.

Restrictions: No person shall take migratory game birds by the aid of baiting (placing feed such as corn, wheat, salt, or other feed to constitute a lure or enticement). Hunters should be aware that a baited area is considered to be baited for 10 days after the removal of the bait, and it is not necessary for the hunter to know an area is baited to be in violation.

It is unlawful to use any recorded or electrically amplified bird calls or imitations of bird calls while attempting to take migratory game birds.

Closed Seasons. No person shall take migratory game birds during the closed season.

Shooting or Hawking Hours. No person shall take migratory game birds except during the hours open to shooting and hawking as prescribed.

Field Possession Limit. No person shall possess more than one daily bag limit while in the field, or while returning from the field to one's car, hunting camp, home, etc.

Possession of Live Birds. Crippled birds must be immediately killed.

Importation. No person shall import during any one week beginning on Sunday more than (1) 25 doves and 10 pigeons from any foreign country, and (2) 10 ducks and 5 geese from any foreign country except Canada and Mexico. Importation of doves and waterfowl from Canada and Mexico may not exceed Canadian or Mexican export limits and these vary from province to province and from state to state. In addition, one fully feathered wing must remain attached to all migratory game birds being transported or shipped between a port of entry and one's home or to a migratory bird preservation facility. No person shall import migratory game birds belonging to another person.

Motor vehicles may not be used off established roads and trails on Federal Waterfowl Production Areas.

More restrictive regulations may apply to National Wildlife Refuges open to public hunting. For additional information on Federal regulations, contact Special Agent-in-Charge, U.S. Fish and Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver, Colorado 80225. Telephone: 303-234-4612.

SUNRISE AND SUNSET TIME

HOURS OF HUNTING shall be Central Daylight Time August 15 through October 28 and Central Standard Time October 29 through the end of most seasons. The time of sunrise and sunset at Bismarck is given below. The sun rises and sets one minute later for each 12 1/2 miles westward of Bismarck and one minute earlier for each 12 1/2 miles eastward of Bismarck.

AUGUST			SEPTEMBER			SEPTEMBER			OCTOBER			OCTOBER			NOVEMBER			NOVEMBER			DECEMBER			JANUARY		
Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset	Date	Sunrise	Sunset
15	6:40	8:55	1	7:02	8:25	20	7:27	7:47	6	7:48	7:16	25	8:15	6:39	9	7:37	5:17	28	8:03	4:50	14	8:20	4:55	1	8:28	5:06
16	6:42	8:54	2	7:03	8:23	21	7:28	7:45	7	7:49	7:14	26	8:16	6:38	10	7:38	5:16	29	8:04	4:58	15	8:21	4:55	2	8:28	5:07
17	6:43	8:52	3	7:05	8:21	22	7:29	7:43	8	7:51	7:12	27	8:17	6:36	11	7:39	5:14	30	8:06	4:58	16	8:22	4:56	3	8:28	5:08
18	6:44	8:50	4	7:06	8:19	23	7:31	7:41	9	7:52	7:10	28	8:19	6:34	12	7:41	5:13				17	8:22	4:56	4	8:28	5:09
19	6:45	8:49	5	7:07	8:17	24	7:32	7:39	10	7:53	7:08	13	7:42	5:12							18	8:23	4:56	5	8:28	5:10
20	6:47	8:47	6	7:09	8:15	25	7:33	7:37	11	7:55	7:06	29	7:20	5:33	14	7:44	5:11				19	8:24	4:57	6	8:27	5:11
21	6:48	8:45	7	7:10	8:13	26	7:35	7:35	12	7:56	7:04	30	7:22	5:31	15	7:45	5:10				20	8:24	4:57	7	8:27	5:12
22	6:49	8:43	8	7:11	8:11	27	7:36	7:33	13	7:58	7:02	31	7:23	5:30	16	7:47	5:09				21	8:25	4:57			
23	6:51	8:41	9	7:12	8:09	28	7:37	7:31	14	7:59	6:59				17	7:48	5:08				22	8:25	4:58			
24	6:52	8:40	10	7:14	8:07	29	7:39	7:29	15	8:00	6:57				18	7:50	5:07				23	8:26	4:59			
25	6:53	8:38	11	7:15	8:06	30	7:40	7:27	16	8:02	6:55				19	7:51	5:06				24	8:26	4:59			
26	6:54	8:36	12	7:16	8:03				17	8:03	6:53				20	7:52	5:05				25	8:26	5:00			
27	6:56	8:34	13	7:18	8:01				18	8:05	6:51				21	7:54	5:04				26	8:27	5:00			
28	6:57	8:32	14	7:19	7:59				19	8:06	6:50				22	7:55	5:03				27	8:27	5:01			
29	6:58	8:30	15	7:20	7:57				20	8:07	6:48				23	7:56	5:02				28	8:27	5:02			
30	7:00	8:29	16	7:22	7:55				21	8:09	6:46				24	7:58	5:01				29	8:27	5:03			
31	7:01	8:27	17	7:23	7:53				22	8:10	6:44				25	7:59	5:01				30	8:28	5:03			
			18	7:24	7:51				23	8:12	6:43				26	8:00	5:00				31	8:28	5:04			
			19	7:25	7:49				24	8:13	6:41				27	8:02	4:59									

NBS 1995 ANNUAL REPORT FOR THE SWIFT FOX CONSERVATION TEAM

MARSHA A. SOVADA, Northern Prairie Science Center. 8711 37th St SE, Jamestown, ND 58401; (701-252-5363; fax 701-252-4217; marsha_sovada@nbs.gov)

INTRODUCTION

In 1995 Northern Prairie Science Center submitted two proposals to study swift fox. One study, not funded, was to evaluate the potential of interspecific competition (with coyotes and red foxes) as an ecological barrier to swift fox range expansion and population growth. We were asked to modify the second proposal and ultimately funding was approved (at a greatly reduced level).

The objectives of the funded study are: 1) to evaluate survey methods for monitoring distribution, and 2) to compile information about present distribution of swift foxes.

OBJECTIVE 1 - EVALUATION OF SURVEY METHODS

Meaningful survey methods to estimate relative density of swift fox populations are unavailable. Although an estimate of population size may seem superior to estimates of relative density, it is not particularly useful nor a realistic goal. A measure of a density index can provide information about swift fox populations through observing long term trends in single populations, and comparing one population with another. Currently, the most common survey methods engaged by state agencies include spotlight indices, scent station surveys, catch per unit effort, and track surveys. However, these sampling methods have not been compared to known population levels and thus, results are difficult to interpret.

This one year evaluation will be conducted at two sites in western Kansas; and I am requesting assistance from other biologist conducting studies in other parts of swift fox range. Using data from several locations in this evaluation will provide results applicable to a wider area.

I will attempt to relate indexes of abundance to density estimates from radio-marked fox populations on our study areas. Methods being evaluated are spot-light surveys, scent-station surveys, systematic track surveys, and scat deposition rates. Catch per unit effort will not be evaluated because prior trapping at the Kansas sites likely would bias results.

Results of surveys and the density of swift foxes will be compared to determine if surveys are indicators of abundance. The different survey methods will be evaluated for relative utility, efficiency, and costs as tools for monitoring distribution of swift foxes and for monitoring relative abundance and population trends.

Surveys results and simulated data will be used to assess properties of our scent-station and spot light indices and simulation models to test the estimators of populations density. Models will assist in designing of surveys to best detect change in population density and provide insight to what magnitude of change must occur for surveys to detect change.

OBJECTIVE 2 - INFORMATION DISSEMINATION

I am currently preparing a section for the Northern Prairie Science Center Home Page that will provide (and maintain) current information about swift foxes. The first immediate attention will be to serve

distribution information as provided by the Swift Fox Conservation Team members and other sources. Essentially, the team is doing the ground work, I am just serving the distribution data, along with some additional information in widely distributed outlet. I will be approaching each state's Swift Fox Conservation Team member prior to serving information to attain permission for using their distribution data.

The presentation of the information is still in a planning phase and I welcome input by anyone interested in development of this information outlet. At this time the plan is to provide the information by-state - by-county. Information sources will be identified. Additionally, there are plans to include a citation list. The Home Page will serve other information or data contributed by the team or individuals. I am open to suggestions from anyone with interest in participation of the development of this information source and I would be happy to include other information the team or individuals wish to include.

Note:

If you wish to access Northern Prairie Science Center's Home Page, our address is <http://www.npsc.nbs.gov>. We have been serving distribution data for a variety of species and other information via this outlet. At this time, the format for disseminating information about swift foxes via Home Page will be similar (but more information will be included) to the presentation of North American Butterflies.

POPULATION MODELING

Additionally, the dynamics of swift fox populations will be examined using existing (or modified) population models. Data from past studies, data offered from ongoing studies, and data gathered in this field study will be used in this modeling effort. This exercise will be a step towards development of viability models and will focus identification of information gaps.

Sharing by Swift Fox Conservation Team members of data relative to population biology (e.g., reproductive rates, mortality rates, home range sizes) would be greatly appreciated. I am not developing new models, but rather synthesizing the best available information for input into exiting stochastic and deterministic population models. Steve Allen presented modeling results at our September meeting in Denver. My goal to compile the best information currently available from published and unpublished sources to improve the predictive capability of models. Ultimately, the models and population parameters data will be provided to team members for examination of local population dynamics. The utility of the models for assisting in management decision and predictive power of the models will improve as we identified and fill the information voids on regional and local levels.

EXPENDITURES

Northern Prairie Science Center assumed all costs of all activities of NPSC staff related to swift fox for the year 1995.

Total estimated costs for 1995 activity are \$8,000 - \$10,000.

Funding sources for 1996 include Northern Prairie Science Center, National Biological Service (Species-at-Risk Competitive Funding Program), North Dakota Game and Fish Department, Kansas Department of Wildlife and Parks, Swift Fox Conservation Team Funds (USFWS).

DISCUSSION AND RESEARCH NEEDS

The future of swift fox populations in North America is uncertain despite healthy populations in parts of their range. The factors limiting expansion of populations into unoccupied portions of their historic range are unknown. Information on food habits impart that swift foxes are opportunistic foragers, using a wide variety of food items including small mammals, birds, insects, reptiles and carrion (Kilgore 1969, Scott-Brown et al. 1987). Populations, to persist, need to reach a level that can withstand occasional severe environmentally-induced mortality or reduced productivity. Winter food resources may be particularly limiting in the northern portions of their range. Optimal habitat for swift foxes is believed to be short grass prairie with relatively level terrain and available holes for shelter and protection (Scott-Brown et al. 1987). However, healthy populations also occur in the agricultural landscape of western Kansas (L. Fox, per. comm.). Although food and habitat may contribute to the retracted distribution and possibly reduce productivity of swift foxes, there appears to be suitable habitat within the historic range available to swift foxes that currently is not occupied by the species.

There are two possible reasons for the inability of swift foxes to achieve marked expansion into suitable areas within their historic range. Swift foxes may simply be poor colonizers. Dispersing foxes are at risk to mortality as they move through unfamiliar areas seeking an area for settlement. Significant changes in landscape (increased agriculture, lack of corridors) may result in increased risk of predation. Competition with coyote (*Canis latrans*) and red fox (*Vulpes vulpes*) confer a likely ecological barrier for settling into new areas. Coyote killing of swift foxes appears to have significantly affected the experimental reintroduction of swift foxes in Canada (Scott-Brown et al. 1986, Carbyn et al. 1994). The relationship between red foxes and swift foxes is unknown. However based on known interspecific relationships between other canids (see following paragraph), the red fox may be a substantial barrier to swift fox range expansion.

Competition between North American canid species has been well documented (Carbyn 1982, Rudzinski et al. 1982, Sargeant et al. 1987, Bailey 1992, Ralls and White 1995). Studies have shown coyotes avoid wolf territories and are sometimes killed by wolves, and that an inverse relationship exists between numbers of wolves and numbers of coyotes (Mech 1970, Berg and Chesness 1978, Fuller and Keith 1981, Carbyn 1982, Dekker 1989). Coyotes exclude red foxes from their home ranges and there is an inverse relationship between coyote and red fox populations (Voigt and Earle 1983, Sargeant et al. 1987, Major and Sherburne 1987, Harrison et al. 1989). Soulé et al. (1988) reported an inverse relationship existing between coyote and gray fox (*Urocyon cinereoargenteus*) populations. Coyote induced mortality of red, kit (*Vulpes macrotis*), and swift foxes is known to occur (Scott-Brown et al. 1986, O'Farrell 1987, Sargeant and Allen 1989, Carbyn et al. 1994). Hersteinsson and Macdonald (1992) proposed that the southern limit of the range of the arctic fox (*Alopex lagopus*) is determined by the distribution and abundance of the larger red fox through interspecific competition. The red fox domination of the smaller arctic fox in direct competition was confirmed in an enclosure study by Rudzinski et al. (1982). That study showed that arctic foxes relinquish the best den and feeding sites to red foxes. Ralls and White (1995) suggest that red foxes may pose a greater threat to kit fox populations than coyotes. Competition between canids has been used in management. Sterilized red foxes were introduced to Alaskan islands as biological control agents to eradicate arctic foxes that had devastated breeding avifauna on the islands (Bailey 1992). While previous trapping efforts had failed, this effort successfully extirpated the arctic fox from the islands. There is considerable evidence that interspecific competition, often in the form of interference competition, acts as a mechanism regulating spatial distribution and population size among canid species. Information about interspecific relations between swift and red foxes is needed to make

management decisions about both species, but will be especially important if reintroduction of swift foxes to areas they currently do not occupy is considered as a management option.

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COMMITTEE REPORT: Up-date on SFCT funding assistance to states for determining swift fox distribution.

The SFCT committee (Marsha Sovada, Steve Allen, Peggy Horner) assigned to distributing funds among states requesting assistance in efforts to determine distribution of swift fox are near to completion of their task. New Mexico, Oklahoma, and Texas submitted proposals that were reviewed by the committee and all were funded at the maximum level (approximately \$6000). As of the new year, funds had not yet been distributed to the states, largely because of red tape and the federal furlough (I apologize for the delays), however the process is near to success.

1995 SWIFT FOX SURVEY

**FALL RIVER RANGER DISTRICT
BUFFALO GAP NATIONAL GRASSLAND
NEBRASKA NATIONAL FOREST**

**by
LYNN ALLAN HETLET**

INTRODUCTION

Surveys to determine locations of swift fox (*Vulpes velox*) were conducted on Buffalo Gap National Grassland from 1989 through 1994. Additional new areas were surveyed in 1995 as were the three annual routes established in 1994.

SURVEY AREAS

Approximately 9,900 acres of formerly unsurveyed (or not surveyed for 5 years) areas of Buffalo Gap National Grassland in Fall River County of South Dakota were surveyed (Maps #1, #2). The established annual routes survey approximately 6,250 acres.

METHODS

Approximately 65 man-hours (including travel time) were spent establishing and utilizing bait stations on approximately 9,900 acres of grassland, and ninety man-hours (including travel time) were spent on the established annual routes.

Methods used were similar to those used last year, with one exception. An attempt was made to improve the tracking medium by adding various amounts of vegetable oil to sand. The ideal ratio seems to be one cup of oil per gallon of sand.

RESULTS AND DISCUSSION

Several aspects of the new oil/sand tracking medium make it much more desirable than sand alone. Not only does it accept a more detailed track, but the mixture is not easily disturbed by wind and/or insects, and therefore retains the track much longer. While rain will diminish some of the details, I found tracks that were still identifiable two days after a rainfall. Because tracks are retained much longer, it is no longer necessary to check the stations early in the morning (although the slanted light at that time accentuates the relief of the tracks, making them easier to identify). Time could thus be saved by combining checking for tracks with baiting the stations in the afternoon and evening.

Newly Surveyed Area (Smithwick)

The new area surveyed in the Smithwick vicinity (Map #2) showed tracks of coyotes, striped skunks, possibly red fox, and, on the third night (and only at two stations) swift fox. Although this area contained four prairie dog towns, the swift fox tracks were found no closer than 3/4 mile from the nearest town. Coyote tracks, on the other hand, were frequently found in the dog towns. No badger tracks were found, even though a badger was seen walking within one meter of a baited station.

This area had been surveyed for swift fox in 1989 and 1990. None were found, although dens were found that were thought to have been used by them prior to 1989.

Smithwick Area

The established annual route in the Smithwick area had few tracks, the majority of which were striped skunk, with one or two coyote tracks. Again, swift fox tracks were found only on the third night (and only at one station).

South Pioneer

The established annual route in the Oelrichs area yielded striped skunk tracks at several stations, coyote tracks at nearly half of the stations, and no swift fox tracks.

Ardmore Area

The established annual route in the Ardmore area showed striped skunk tracks at only four stations, and coyote tracks at only two stations, over the three night run. Ten of the 31 stations had swift fox tracks the first night, 16 the second night, and 23 the third night.

One active den was found in this area (Map #3), with two swift fox seen there regularly from late August to early September.

Due to the grouping of bait stations showing tracks the first morning, I believe there are probably three active dens in this area.

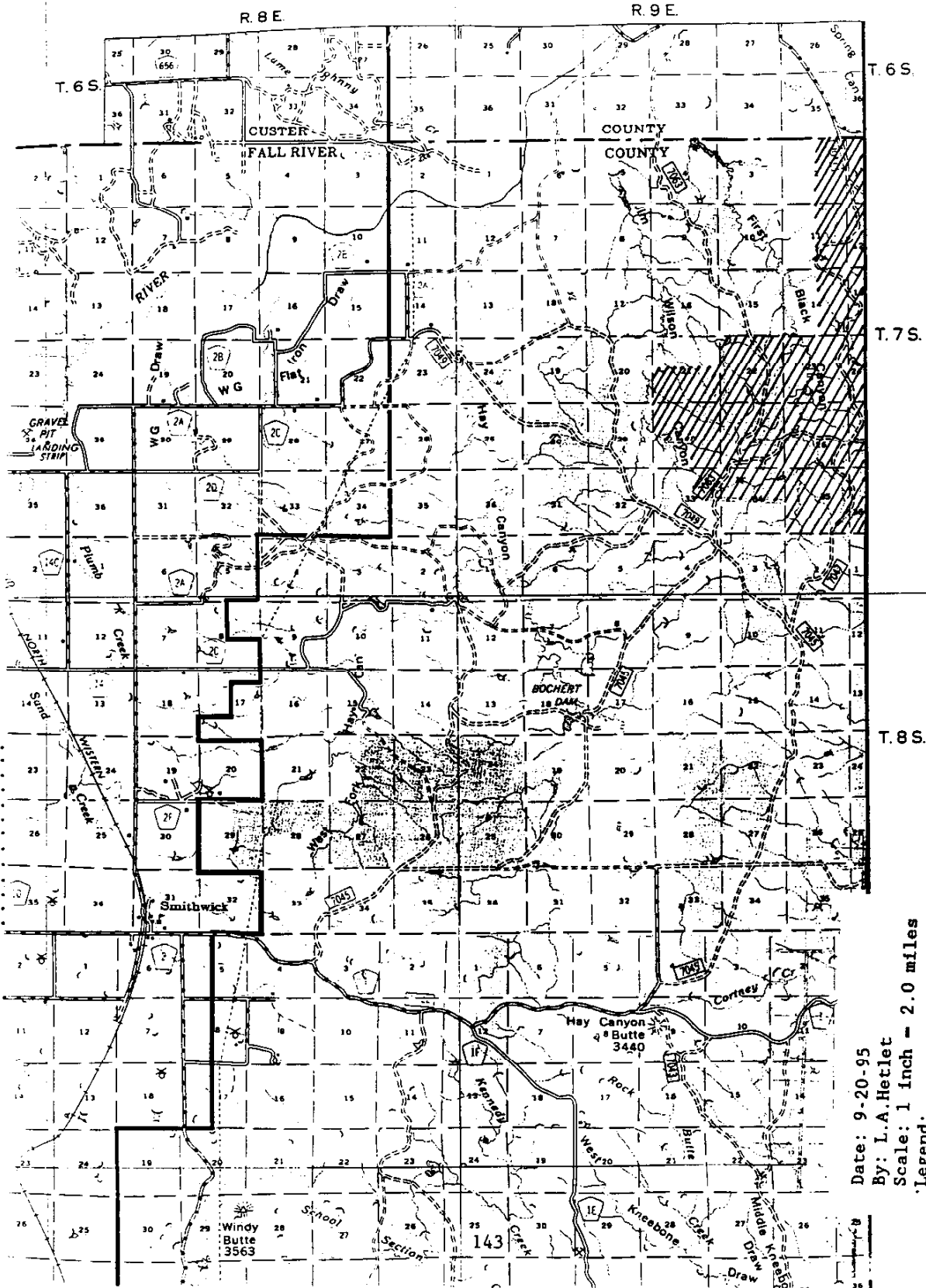
Newly Surveyed Area (Ardmore)

Surprisingly, the new area checked adjacent to the Ardmore established route, (Map #1) yielded no evidence of swift fox. Of the 29 bait stations, only six stations had tracks, all of striped skunks.

15°00'

103°07'30"

103°00'00"



43°
30'
00"

43°
22'
30"

103°07'30"

Date: 9-20-95

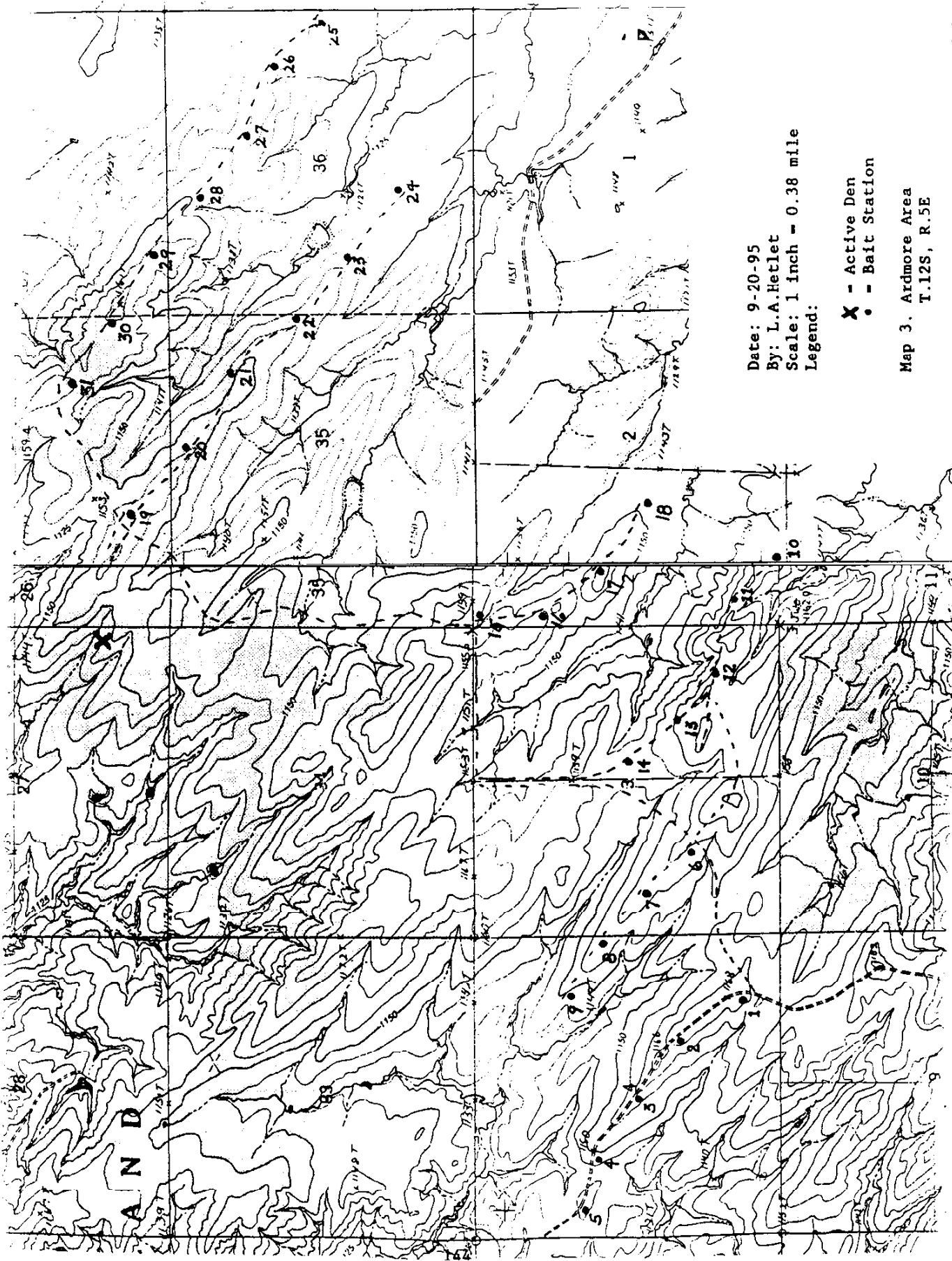
By: L.A.Hetlet

Scale: 1 inch = 2.0 miles

Legend:

Area surveyed

Map 2. Smithwick Area
T.7S, R.9E



Date: 9-20-95
By: L.A.Hetlet
Scale: 1 inch = 0.38 mile
Legend:

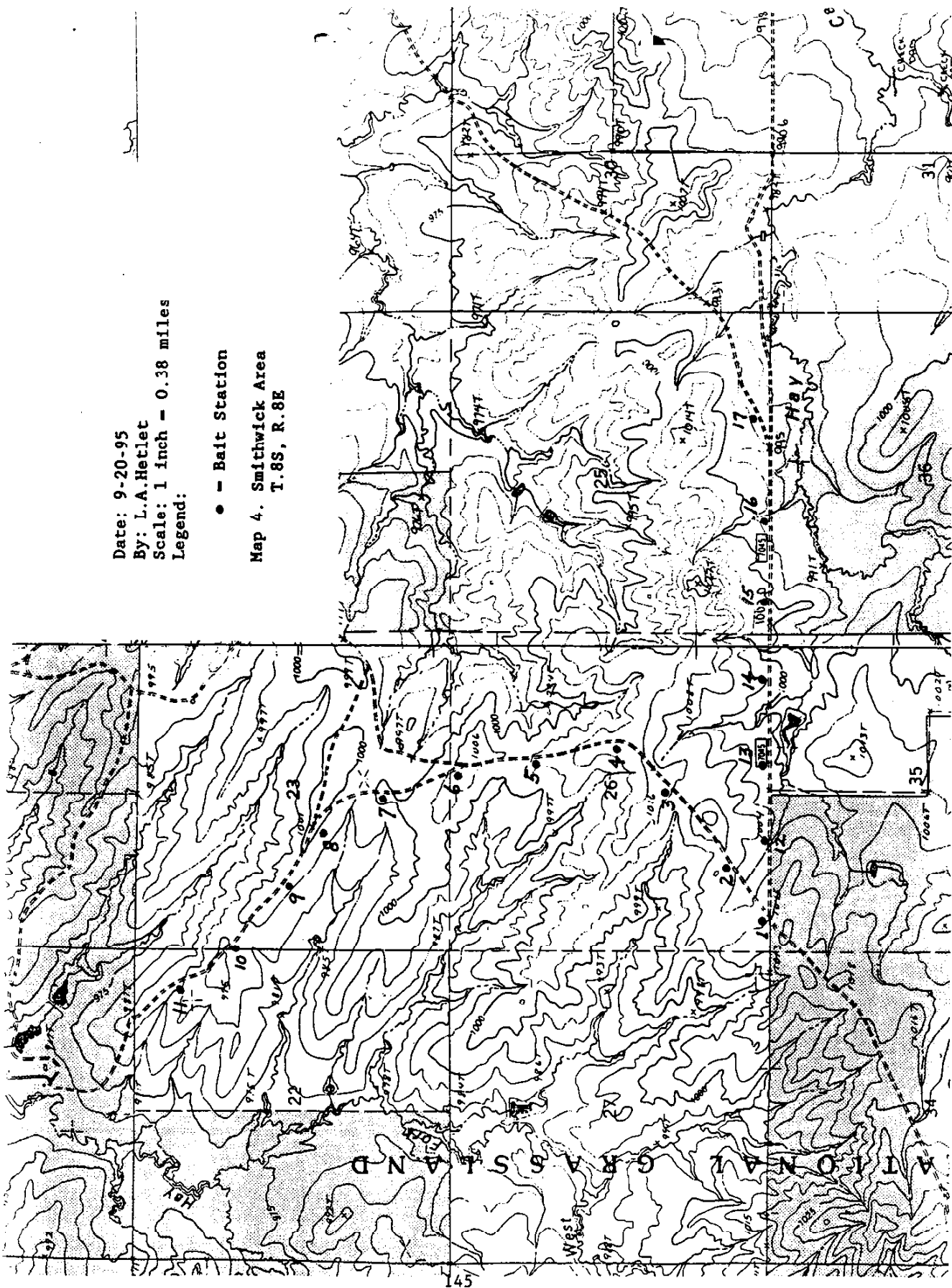
- X - Active Den
- - Bait Station

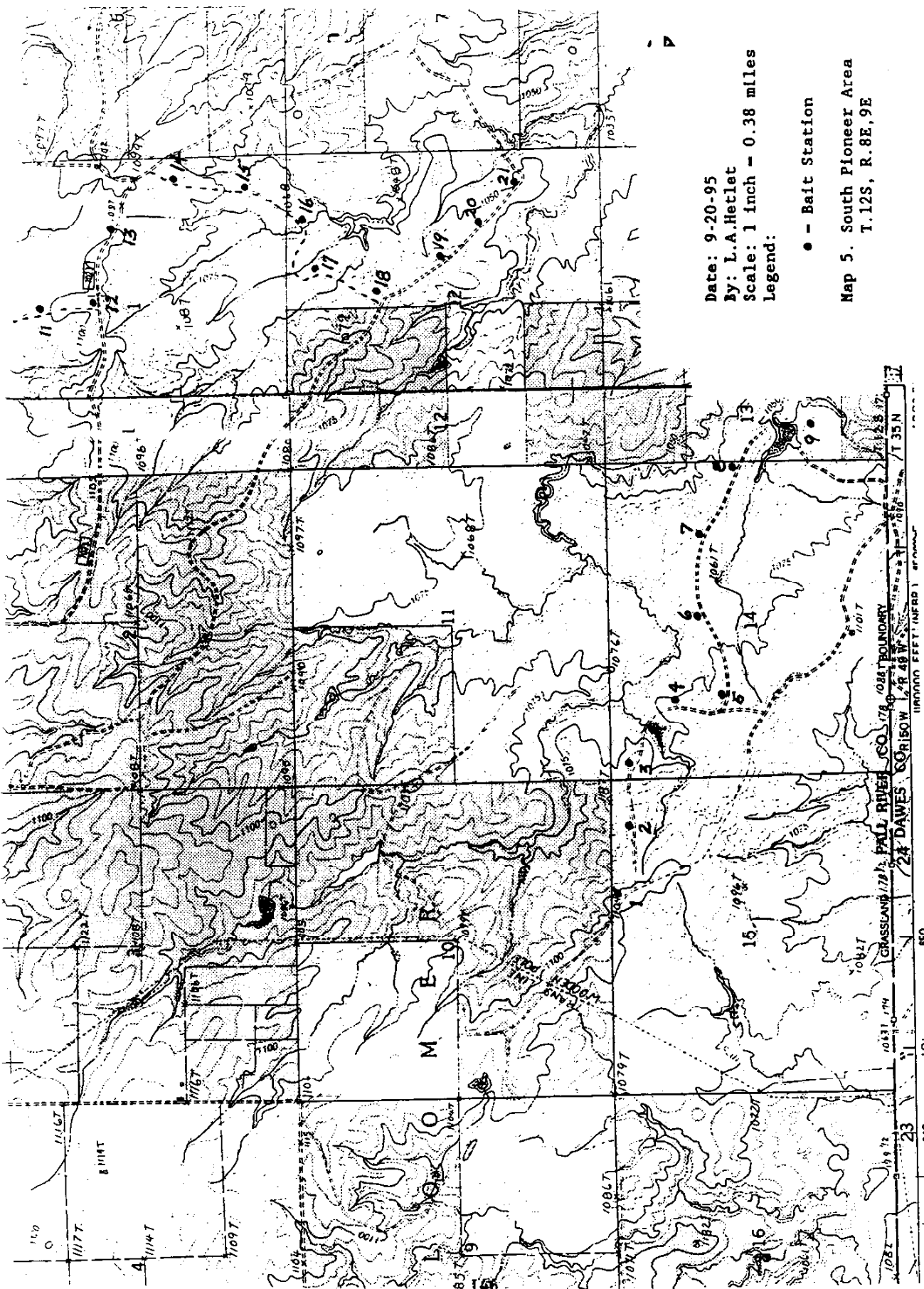
Map 3. Ardmore Area
T.12S, R.5E

Date: 9-20-95
 By: L.A.Hetlet
 Scale: 1 inch = 0.38 miles
 Legend:

● - Bait Station

Map 4. Smithwick Area
 T.8S, R.8E





Date: 9-20-95

By: L.A. Mettlet

Scale: 1 inch - 0.38 miles

Legend:

• - Bait Station

Map 5. South Pioneer Area

T. 12S, R. 8E, 9E

Bait Station	Day 1	Day 2	Day 3
1	MEME	VUVE	VUVE
2	VUVE	VUVE	VUVE
3	VUVE	VUVE	VUVE
4	VUVE	VUVE	VUVE, MEME
5	VUVE		VUVE
6	VUVE, MEME	VUVE	VUVE
7		VUVE	
8		VUVE	VUVE, MEME
9	VUVE	VUVE	VUVE
10			VUVE
11			VUVE
12			VUVE
13		MEME	
14			
15			VUVE
16			
17			VUVE
18			VUVE
19		VUVE	VUVE
20			VUVE
21			
22			VUVE
23	VUVE		VUVE
24	VUVE	VUVE	VUVE
25	VUVE	VUVE	VUVE

Bait Station	Day 1	Day 2	Day 3
26	VUVE	VUVE	VUVE
27		VUVE	VUVE
28		VUVE	VUVE
29		VUVE	
30		CALA	
31		VUVE,CALA	

TABLE 1. Tracks on Ardmore Area swift fox survey route

VUVE - swift fox

MEME - striped skunk

CALA - coyote

TATA - badger

VUFU - red fox

August 15-17, 1995

Bait station	Day 1	Day 2	Day 3
1			
2	CALA	MEME	
3	MEME		
4			
5			
6			
7			
8			
9			
10	MEME		MEME
11			
12	CALA?	CALA?	CALA?,VUVE
13			MEME
14			
15			
16			
17			

TABLE 2. Tracks on Smithwick Area swift fox survey route

MEME - striped skunk
LESP - jackrabbit species
SYSP - cottontail species

August 2-4, 1995

Bait station	Day 1	Day 2	Day 3
1	CALA	CALA	CALA
2		CALA	
3		CALA	CALA
4	MEME	CALA	CALA
5	MEME		CALA
6			CALA
7			CALA
8			CALA
9		MEME	MEME
10			
11			
12			
13			
14	MEME		
15			
16			
17			
18			
19			
20			
21			

TABLE 3. Tracks on South Pioneer Area swift fox survey route

MEME - striped skunk

VUFU - red fox

TATA - badger

August 8-10, 1995

TIM BYER
WILDLIFE BIOLOGIST
THUNDER BASIN NATIONAL GRASSLAND

PHONE CONVERSATION NOV 1, 1995

THE THUNDER BASIN PUT OUT 30 CARBON PLATES DURING SUMMER OF 1995. THE PLATES WERE PLACES 1 MILE APART.

NO SWIFT FOX TRACKS WERE RECORDED.

TIM PLANS TO PUT OUT A REPORT SOME TIME IN DECEMBER SUMMARIZING THE SURVEY.

Bob,

Here's an update of the swift fox surveys we have been able to complete on the grasslands this year.

Cimarron:

No formal survey in 1995. This week Lloyd Fox, the furbearer biologist with Kansas Department of Wildlife and Parks, did some live trapping, spotlighting and track board surveys in western Kansas, including some effort on the Grassland. They found 1 abandoned den on the Cimarron. We will be spending more time trying to determine the presence and or density of foxes on the Cimarron the first 2 weeks on November.

Comanche:

We didn't do any real comprehensive survey work for foxes this year, more of a "prospecting" trip to experiment with techniques and figure out how much time it required. However, we did detect some animals with spotlights this summer.

August 8	15 person-hours spent 50 miles searched	3 individuals sighted 1 active den located
September 13	10 person-hours 91 miles searched	2 individuals sighted
September 14	11 person-hours 62 miles searched	2 individuals sighted
September 18	10 person-hours 50 miles searched	2 individuals sighted

I'm still thinking about your offer of sending you fox trapper down here to help us out. The problem is that this forest is trying to get into the unified budget business and we are experiencing lots of growing pains. As of now I don't know how much money I have for FY96, including what is available for surveys.

Hope this info is what you needed.

Jerry



COMANCHE NATIONAL GRASSLAND
27162 HIGHWAY 287, PO BOX 127
SPRINGFIELD, CO 81073
TEL: 719-523-6591
FAX: 719-523-4861

TO: FAX NUMBER: 605-745-4179 DATE: _____
Name: Bob Hodorff
Company: _____
Street: Fall River District
City: _____ State: _____

FROM:
Name: KEVIN KACZMAREK Comanche N.G.

SPECIAL INSTRUCTIONS:

Bob here's the Annual report
which covers the Eastern 1/4 of
grassland. The other 3/4 will be covered
in surveys in the next 4 yrs. Also, I
want to try some tracking plates this fall.
Give me some info if you have it.

Thanks,
KEVIN

COMANCHE

"SCALED"

QUAIL



SWIFT FOX SURVEY FOR 1995
COMANCHE NATIONAL GRASSLAND

INTRODUCTION AND BACKGROUND

The Swift Fox is endemic to the short and midgrass prairies of western North America. Swift Fox is thought to have declined over much of its former range. Nebraska has listed the fox as endangered and it is a Category II species as listed by US Fish and Wildlife Service. Status of this animal in Colorado, and in particular, Comanche National Grassland, is currently unknown but thought to be stable or increasing. The Grassland is considered important habitat for this tiny Canid. To manage for a viable population of Swift Fox a multitude of information must be gathered on population, ecology, and effects of different management practices on the species.

This spotlight survey is designed as a distribution survey for the area to provide basic information on which to base additional surveys and research. Little information is available on the species. Our survey will utilize this information to identify potential areas for survey and continue to identify occupied habitat on the Grassland. Identifying occupied habitat is only the first step in developing a sound management strategy. Cooperation with Colorado Division of Wildlife, US Fish and Wildlife Service, and utilizing the expertise available through University of Northern Colorado and Colorado State University will be important in the development of this strategy.

METHODS

A spotlight survey route was established through potential Swift Fox habitat (Figure 1). Nocturnal surveys were conducted the nights of September 13, 14, and 18, 1995. Only a portion of potential habitat was covered over the three survey periods. Routes are varied to cover all suspected habitat over a number of years. Approximately 4-5 hours of continual spotlight survey was conducted per night. Survey times, total survey hours, and other survey information were recorded on survey data sheets (Appendix A). Sighting locations are identified on Figure 1.

The survey crew consists of two to three people per nightly survey period

Kevin Kaczmarek, USDA, Forest Service. Surveyed all three periods.

Greg Spell, USDA, Forest Service. Surveyed all three periods.

Surveys were conducted during three consecutive nights. Surveys were approximately 4-5 hours long, between the dusk and dawn hours. The crew traveled the survey route from 3 to 20 mph sweeping areas to the sides and front of the survey vehicle with 400,000 and 1,000,000 candlepower spotlights in an effort to observe Swift Fox or their amber to green eye shine. The spotlight was passed at least twice over the field of view as an animals attention may be attracted to the light on the first pass and eye shine observed on the second. A positive identification of all observed animals was attempted before continuing the survey.

RESULTS AND DISCUSSION

A total of two hundred and three miles of route were surveyed over the three nights. Approximately 15.5 hours were expended over the three survey nights. Six fox were confirmed during the survey.

Each year some observation of eye shine that appear to be fox, from physical and behavioral characteristics, can not be confirmed. This is due to distances too great to be confirmed through binoculars and lack of access to get closer from fencing, terrain or land ownership. These occurrences are also being mapped this year as they may provide information useful for future efforts. zero unconfirmed sightings occurred in 1995.

The fox appears to be active during all hours of darkness. Observations are made at a fairly consistent rate from dusk to dawn. Spotlighting can continue into dawn until the spotlight is barely visible on the ground as reflected eye shine is still visible. A majority of the observations occurred while lone or paired foxes were on open prairie as they went about their nightly routine. Reaction to the spotlight varied from running from the light to taking advantage of the light to aid in foraging activities. Spotlighting appears to be an effective method for locating swift fox on shortgrass prairie. Almost all sightings occur on shortgrass types which were heavily grazed. Fox have been observed utilizing cropland in Kansas in areas where the farm ground is isolated from good native prairie habitat. It appears the fox prefers native shortgrass prairie if available. A few fox, in previous surveys, were observed in a Pinion-Juniper and cholla cactus habitat type with a heavily grazed shortgrass understory. Go-back vegetation and short grass types with small patches of taller native grasses such as western wheatgrass or native shrubs such as sand sage appear to be utilized as readily as pure shortgrass as long as they are heavily grazed. In the Comanche area, fox are rarely sighted where grass cover is taller than 6 inches as found on Conservation Reserve Program (CRP) land or crested wheatgrass pastures.

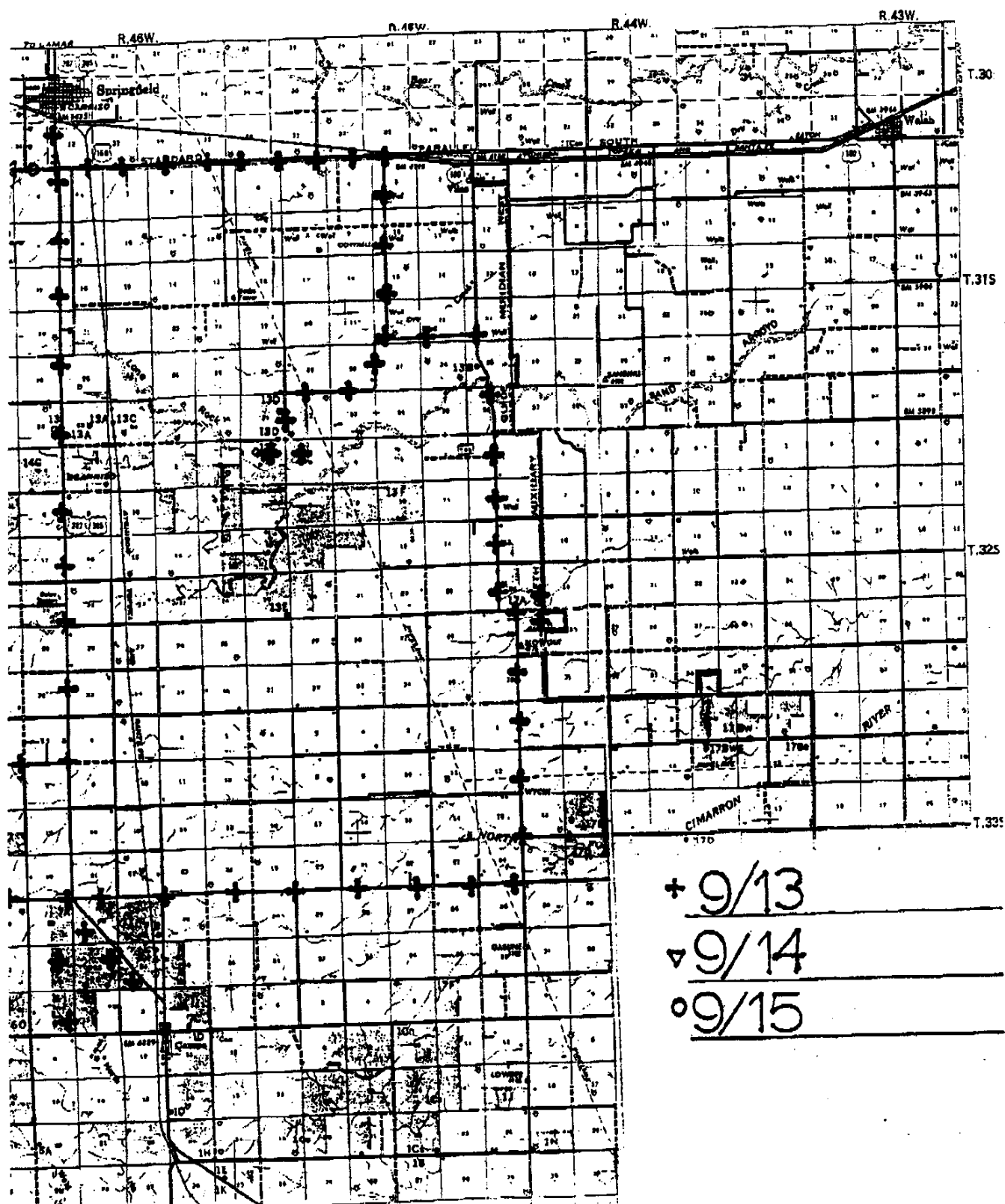
Confirmation of sightings is more difficult in taller grass or shrub types when eye shine is located at a distance or vehicle access is restricted. It is common to see only one glimpse of eye shine as many fox are not overly interested in the spot light. Immediate followup by driving towards the site helps to recapture the foxes attention and confirm species. If vehicle access is restricted continued sweeping with the spotlight will usually recapture the foxes attention within a minute. On occasion, one person looking through binoculars while the other operates the spotlight during confirmation has resulted in additional fox sightings in the distance where eye shine was not visible to the naked eye.

The following species were observed during the survey:

- Beaver
- Horned Lark
- Common Nighthawk
- Great Blue Heron
- Ferruginous Hawk
- Ord Kangaroo Rat
- Cottontail Rabbit
- Blacktail Jackrabbit
- Whitetail Jackrabbit
- Skunk
- Badger
- Coyote
- Mule Deer
- Antelope
- Domestic House Cat
- Domestic Cattle
- Domestic Horse

Over a number of years this survey information should help establish a pattern of use by Swift Fox on the Grassland identifying the key areas of habitat. The Forest Service is a multiple use agency. Dispersed recreational use of the Grassland is multiplying at a steady rate as the Front Range populous turns away from the mountains to discover their heritage on the Great Plains. Other uses have the potential to effect swift fox habitat. It is important to gather enough information to proactively manage for a viable population prior to irratrivable or irreversible commitment of Swift Fox habitat occurs due to ignorance of the species needs.

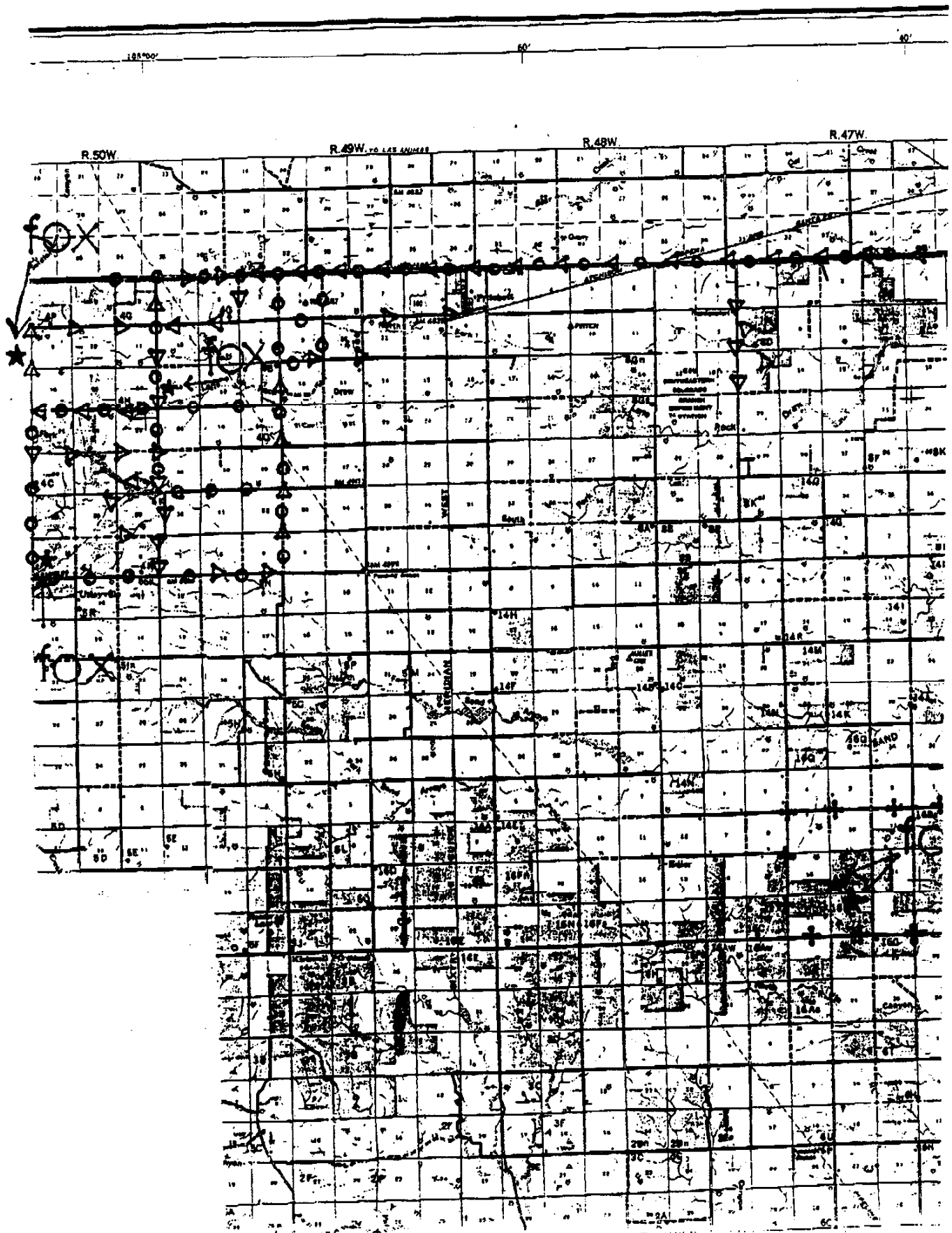
FIGURE 1
SURVEY ROUTE AND OBSERVATION LOCATION



+ 9/13

▽ 9/14

° 9/15



APPENDIX A
SURVEY SUMMARY AND DATA SHEETS

SURVEY SUMMARY

- | | |
|---|--|
| 1. START AND COMPLETION DATES. | Evening of 9/13/94
to Morning of
9/17/94 |
| 2. TOTAL HOURS OF SPOTLIGHT SEARCH. | 15.5 hours |
| 3. TOTAL MILES SEARCHED BY SPOTLIGHT. | 203 miles |
| 4. TOTAL SWIFT FOX OBSERVED BY SPOTLIGHT SEARCH | 06 confirmed
0 unconfirmed |
| 5. LOCATION OF SWIFT FOX OBSERVED | See nightly data
sheet |
| 6. NARRATIVE DESCRIBING SEARCH TECHNIQUE USED. | See report |
| 7. COPIES OF FIELD DATA SHEETS. | Attached |

NIGHTLY DATA SHEET

1. DATE. Evening of 9/13/94.
2. HOURS SPENT SEARCHING. 20:00 PM to 01:00AM
3. MILES SEARCHED. 91 miles
4. SWIFT FOX, LOCATION, TIME, HABITAT.
- CONFIRMED
- One - NE NW Sec 22, 33S, 47W -12:10 AM- Shortgrass/western wheat,
moderately grazed
- One - NE Nw Sec 22, 33N, 47W -12:14 AM- Shortgrass, moderately grazed
- TWO TOTAL CONFIRMED
- UNCONFIRMED
- ZERO TOTAL UNCONFIRMED
5. PHOTOS TAKEN. None
6. NAME, ADDRESS, PHONE, & AGENCY.
- Kevin Kaczmarek
USDA, Forest Service
27162 Highway 287
Springfield, Colorado, 81073
719-523-6591
Wildlife Biologist

7. WEATHER CONDITIONS.

Ground open. Clear. Winds
from north at 5 to 7 mph.
Temperature 65 degrees F.

8. METHOD USED TO SEARCH

Vehicle/spotlight

9. MAPPED SURVEY ROUTE AND LOCATION.

See Figure 1

NIGHTLY DATA SHEET

- | | |
|---|--|
| 1. DATE. | Night of 9/14/95 to morning of 9/15/94. |
| 2. HOURS SPENT SEARCHING. | 20:00PM to 01:30 PM |
| 3. MILES SEARCHED. | 62 miles |
| 4. SWIFT FOX, LOCATION, TIME, HABITAT.
CONFIRMED
One -SE NW Sec 8, 31S, 50W - 23:25 PM -

One UC-SW SW Sec 17, 31S, 47W- 20:40 PM -
ONE FOX TOTAL CONFIRMED
ONE FOX 90% CONFIRMED | Shortgrass, Dispersed Sand Sage, heavily grazed.

Midgrass, rolling topography. |
| 5. PHOTOS TAKEN. | None |
| 6. WEATHER CONDITIONS.. | Ground open. Partly cloudy.
Wind from west at 5 to 10 mph.
Temperature 60 degrees F. |
| 7. METHOD USED TO SEARCH | Vehicle/spotlight |
| 8. MAPPED SURVEY ROUTE AND LOCATION. | See Figure 1 |

NIGHTLY DATA SHEET

1. DATE. Evening of 9/18/94
2. HOURS SPENT SEARCHING. 20:00PM to 01:00AM.
3. MILES SEARCHED. 50 miles
4. SWIFT FOX, LOCATION, TIME, HABITAT.
CONFIRMED
One - SW NW Sec 13, 31N, 50W - 22:17 PM - Midgrass, ungrazed.
One - SW SW Sec 04, 32S, 50W - 23:02 PM - Shortgrass, heavily grazed.
TWO TOTAL CONFIRMED
5. PHOTOS TAKEN. None
6. WEATHER CONDITIONS. Ground open. Clear sky. Wind from the north at 5 mph. Temperature 55 degrees F.
7. METHOD USED TO SEARCH Vehicle/spotlight
8. MAPPED SURVEY ROUTE AND LOCATION. See Figure 1

Pawnee National Grassland - 1995 Report -

MESSAGE DISPLAY FOR ROBERT HODORFF

To Robert Hodorff:R02F07D05A
CC J.LOSCHE
CC D.LOWRY:R02F10A

From: Mark Ball:R02F10D06A

Postmark: Oct 02,95 1:05 PM

Delivered: Oct 02,95 1:04 PM

Subject: Reply to: REPORTS

Reply text:

From: Mark Ball:R02F10D06A

Date: Oct 02,95 1:05 PM

SOUNDS GOOD TO ME. HERE GOES:

USFS, PAWNEE NATIONAL GRASSLAND, WELD COUNTY, COLORADO.
THE SPOTLIGHT DISTRIBUTION SURVEY FOR SWIFT FOX ON THE GRASSLAND WAS
NOT COMPLETED IN 1995. THIS DECISION BETWEEN THE FOREST AND
GRASSLAND LEADERSHIP TEAM, DISTRICT RANGER, AND DISTRICT BIOLOGIST
WAS ARRIVED AT DUE TO BUDGET CONSTRAINTS AND WORK FORCE
REPROGRAMMING. THE SURVEY HAS BEEN CONDUCTED FOR FOUR YEARS. BUDGET
OUTLOOK FOR THE GRASSLAND LEAVE THE CONTINUATION OF THIS SURVEY INTO
FUTURE YEARS UNDER DEBATE.
MARK

Preceding message:

From: Robert Hodorff:R02F07D05A

Date: Oct 02,95 12:46 PM

MARK I JUST RECIEVED YOUR SURVEY REPORT TO SEND TO MARSHA. WHY DON'T
YOU SEND THE NEGATIVE REPORT TO ME AND I'LL GET THE INFORMATION FROM
ALL OF THE OTHER GRASSLANDS AND SEND IT TO HIM ALL IN ONE SHOT. THIS
WAY I CAN KEEP A FILE HERE AND IF I'M ASKED TO WRITE SOMETHING I'LL
HAVE THE INFORMATION RIGHT HERE. I'M NOT SURE IF THIS IS THE BEST
WAY TO DO THINGS BUT IT SEEMS I SHOULD DO SOMETHING AS THE "CENTER OF
EXCELLENCE".

-----X-----

OGLALA NATIONAL GRASSLANDS

1995

NO SURVEYS

NO SIGHTINGS

DISCUSSION

All resource management agencies involved in the Swift Fox Conservation Team (SFCT) are either currently conducting field studies or plan to begin field work on swift fox in 1996. At present field investigations by most states are centered around examination of distribution throughout the historic range. Field data collected to date indicate that the species is more widely distributed and may occupy more habitat types than originally presumed. Wyoming has found evidence from field investigations that the present distribution of swift fox in that state at least equals and probably exceeds that of the historic range. All states except North Dakota, and possibly New Mexico, have found evidence of the production of young swift fox, and all states except North Dakota have found evidence of swift fox presence in their jurisdiction beyond occasional sightings. Field research will begin in the spring, 1996, in Kansas to determine the best method to evaluate swift fox distribution. This will be a cooperative effort between the Kansas Department of Wildlife and Parks and Northern Prairie Science Center (Jamestown, ND). Survival rates from radio-marked swift fox will also be examined in greater detail.

Population modeling is also being closely examined as a means of preliminary investigation of population dynamics of swift fox. Field data available for input into computer models are currently limited (e.g. reproductive performance) or lacking (e.g. annual survival rates) for many areas. Efforts are being planned by the SFCT to upgrade both the quality and quantity of such data. In addition, field tests will then need to be conducted to evaluate results of the computer models.

Questions still persist regarding the taxonomic classification of swift fox. Among the SFCT, there appears to be some valid concern that swift fox and kit fox may not be separate species. Certainly the currently available data indicate there is disagreement on this important point by geneticists and taxonomists. New Mexico and Texas both have a real interest in this question as well as other southern plains states where both species may occur. Nebraska submitted application for funding to the USFWS for DNA testing for swift fox, but the funding was denied. Many comments from the public in South Dakota also indicated the swift fox-kit fox taxonomic question should be resolved before any large amount of money is spent investigating a potential non-problem for an animal that is potentially not a true species. We concur on this point. Given the current taxonomic disagreement that the species may not be separate, it is prudent this distinction be made definitively as soon as possible. Intuitively, if the species were not separate, the case for a federal endangered species classification for swift fox is weakened. Simultaneously, the data base available for swift fox management in the Great Plains would be strengthened with the addition of the kit fox data base.

Interspecific competition appears to be a potential limiting factor for swift fox populations in the Great Plains. Recent data from California indicate coyotes may be detrimental to kit fox survival, but red fox may be catastrophic to their survival. In Colorado, 31% of the radio-collared swift fox were found dead, and in Kansas, coyote predation is the most important cause of mortality on swift fox. North Dakota found very disparate proportions of coyotes, red fox, and swift fox reports since 1970, especially between numbers of red fox and swift fox. They believe interspecific competition, especially from very high densities of red fox, is the most important limiting factor on swift fox in North Dakota. We suspect interspecific competition may not be the only major limiting factor in swift fox populations in the Great Plains; however, the evidence (albeit circumstantial at this point) is mounting that it may be a very strong factor. The SFCT hypothesizes that other limiting factors to swift fox distribution and population size potentially include food base, particularly winter food, habitat composition and condition, diseases and parasites, and public attitudes, especially landowner

resistance to government intrusion on private lands. These potential limiting factors will be investigated as funding and techniques become available.

The evidence collected from swift fox field investigations to date regarding distribution and densities contrasts sharply with the information provided in the original petition to list swift fox as an endangered species. Information presented in this report clearly indicates the petition to list swift fox is severely flawed due to a lack of quality field data from the entire swift fox range. Further, little data cited in the petition, or the administrative finding to list swift fox as an endangered species, were obtained from scientific journals that require critical review and approval prior to publication. Most data cited are from unpublished reports and other similar sources; thus, those data often may not have undergone objective scrutiny from other scientists. This unfortunate circumstance often resulted in a lack of scientific credibility to the data presented. In time, with an increase of more credible scientific data for swift fox, correct answers will be available to explain the differences in distribution and abundance of swift fox since pre-settlement times. Intuitively, management decisions could then be made that should insure survival and possibly allow the increase in both distribution and density throughout the native range, depending upon the nature of the limiting factors involved. The SFCT strongly recommends the Habitat Conservation Assessment and Strategy (HCAS) approach to swift fox management be allowed to proceed. If this is done swift fox management will remain in the field where it should be, and outside a regional office or a courtroom. Only scientifically valid answers to real questions will allow us to formulate management decisions that are defensible and, therefore, of lasting benefit to the species.